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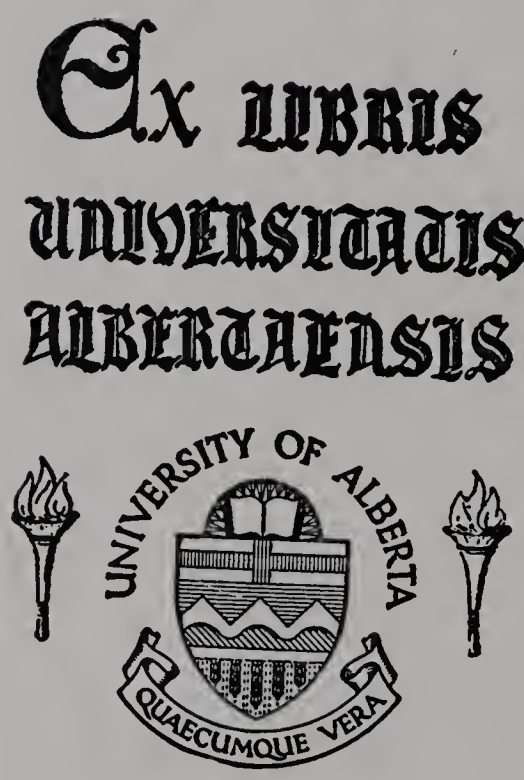

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EFFECTS OF STRESS, RESPONSE CLASS COMPLEXITY, TASK-ORIENTATION, ANXIETY, AND SEX ON VERBAL CONDITIONING

by

LAWRENCE EUGENE PASS

A THESIS

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled Effects of Stress, Response Class Complexity, Task-Orientation, Anxiety, and Sex on Verbal Conditioning, submitted by Lawrence Eugene Pass in partial fulfilment of the requirements for the degree of Doctor of Philosophy.

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ABSTRACT

This study investigated the effects of stress, response class complexity, task-orientation, and sex differences on the performance in a verbal conditioning situation of Ss differing in anxiety. Selection of the first three variables for investigation was based on a consideration of the response-interference theory of the effects of anxiety on performance. The sex variable was included because differences in the performance of males and females have often been reported in studies of learning.

The Ss for the experiment were male and female college students. Anxiety level was defined by their scores on the Taylor Manifest Anxiety Scale. Half the Ss were considered to be high anxious, while the others were low in anxiety. All the Ss were given the task of constructing sentences from words presented to them on cards. There were two levels of response class complexity. Ss in the simple response class groups made up sentences from one of six pronouns and a past tense verb. They were reinforced for using the pronouns "I" or "They." Those in the more complex response class groups constructed sentences with one of six pronouns and either a singular or plural noun. The rewarded response class in this case consisted of the pronouns "I" or "They" plus the singular noun. For all Ss the reinforcement was "good" or "that's good" given over 80 conditioning trials. Half the Ss were under stress during conditioning, the other

half were not. The stress was induced by presenting loud unexpected noises. Task-orienting behavior consisted of the Ss writing our their sentences after they said them out loud. Half the Ss did this, while the rest simply spoke their sentences. The Ss' awareness of the response-reinforcement contingency and their attitude toward the reinforcement were assessed in a detailed interview conducted immediately upon the completion of conditioning.

The main findings resulting from the experiment may be summarized as follows:

(a) As expected, the only Ss to show significant performance gains were those who were either fully or partially aware of the response-reinforcement contingency and who indicated that they wanted to obtain the reinforcement. Those Ss who were aware but didn't care about the reinforcement, or who were motivated but unaware, or who were neither aware nor motivated did not appear to condition.

(b) Aware high anxious females were the only group to give significant evidence of conditioning. Aware high anxious males and aware low anxious males and females, along with the unaware Ss, showed no significant improvement over conditioning trials. It would seem, therefore, that the performance of the aware high anxious females was largely responsible for the finding of significant sex differences in favor of the females in the analysis of the conditioning data.

There is nothing in the results obtained in this study that would

provide an explanation for this sex x anxiety interaction in the performance of the aware Ss.

(c) Evidence of a sex x anxiety interaction was also obtained under the noise-stress treatment. Thus, in the absence of noise high anxious females performed significantly above the high anxious males and low anxious males and females. Introduction of the noise, however, produced a significant disruption in the performance of the high anxious females but tended to facilitate that of the low anxious females so that they performed somewhat better than the high anxious females. The noise did not significantly disrupt the performance of the high anxious males, nor did it facilitate the performance of the low anxious males.

(d) None of the effects for the task-orientation variable were found to be significant.

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INTRODUCTION

According to Skinner (1957) the operant conditioning procedure applied in the experimental modification of animal behavior can be similarly applied to the manipulation of human verbal behavior. He assumes that verbal behavior, like nonverbal behavior, may be considered to be comprised of a greater or lesser number of different types or classes of functionally similar responses. Taken together, these response classes, or verbal operants as he calls them, make up a person's verbal repertoire and determine his potential behavior as a speaker. Whether or not a particular verbal operant will actually be emitted under certain circumstances is determined by the extent to which it has been previously rewarded by a listener. Thus, verbal operants that have obtained reinforcement on many occasions in the past become highly probable, whereas those that no longer obtain reward are eliminated from the individual's repertoire. Often the reinforcement consists of some sort of expression of approval. Approval is assumed to have general reinforcing properties because of its frequent prior association with a wide variety of more 'tangible' primary and secondary reinforcers. It is important to note that the effect of the reward is assumed to be automatic. Awareness by the speaker of the response-reward contingency is not considered to be an essential factor in increasing response frequency. It is only necessary that the speaker initially emit a response that can be reinforced.

According to Skinner then, it should be possible for a listener to deliberately control the nature of a speaker's verbal behavior by differentially rewarding certain types of verbal operants. Furthermore, the speaker need not be aware of this conditioning process.

The present study investigated the effect of the verbal conditioning procedure on persons who differed in anxiety. More specifically, this research was designed to relate the performance of high anxious and low anxious Ss to four variables; the complexity of the response calss that is reinforced by the listener; the presence of stress in the conditioning situation; the performance by the S of what might be described as task-orienting behavior during the conditioning process; and the sex of the S.

The selection of the complexity, stress, and task-orientation variables for investigation was based on a consideration of the response-interference interpretation of the effects of anxiety on performance. Proposed initially to account for the results obtained in a variety of learning and problem-solving situations (Mandler and Sarason, 1952; Child, 1954; Sarason, 1960), the theory assumes that anxiety is a learned reaction that has the functional properties of a drive. Like other drives it energizes the individual into action and thereby facilitates performance. Also, like other drives, it has associated with it characteristic stimuli which evoke certain kinds of responses.

The responses that are evoked are of two general types: self-oriented task-irrelevant responses and task-relevant responses. The self-oriented responses are generalized reactions that are not specifically related to the task confronting the individual. They may be manifested as "feelings of inadequacy, helplessness, heightened somatic reaction, anticipations of punishment or loss of status and esteem, and as implicit attempts at leaving the anxiety-arousing situation" (Mandler and Sarason, 1952, p. 166). The implicit withdrawal responses take the form of defense mechanisms which are aimed at reducing anxiety. Occurrence of these self-oriented responses interferes with task performance. The task-relevant responses, on the other hand, facilitate performance. The form which they take is determined by the nature of the task. They reduce anxiety by leading to task completion.

Under nonstress conditions in which an anxiety reaction is not evoked, there are no performance differences attributable to anxiety.

Under stress-inducing conditions, however, high anxious persons react not only with a higher drive level than the low anxious, but also they have evoked in them a large number of self-oriented task-irrelevant responses. Low anxious individuals respond with a lower drive level, but they also tend to make predominantly task-relevant responses and few self-oriented responses.

With a simple task, in which there are few competing response

tendencies, the disruptive effect of task-irrelevant responses is minimized. This fact, together with their higher drive level, tends to facilitate the performance of high anxious persons. As a result, they tend to perform as well as or even better than the low anxious in a simple task situation.

However, with a complex task, in which there are many competing response tendencies, the likelihood of task-irrelevant responses interfering with performance increases. The disruptive influence of task-irrelevant responses evoked in high anxious individuals tends to offset the facilitative effects of their higher drive level and thereby interferes with their performance. Because low anxious persons respond predominantly with task-relevant responses, they tend to perform better than the high anxious in a complex task situation.

It seems reasonable to assume that any behavior that orients or focuses an individual's attention on the task and thereby interferes with the occurrence of task-irrelevant responses would facilitate the performance of both low anxious and, in particular, high anxious persons.

The response-interference theory of anxiety makes no distinction with respect to sex differences. It appears, however, that such differences have often, though not consistently, been obtained in many studies of learning (Hovland, 1951, pp. 633-634). The sex

variable, therefore, has been included in the present study to investigate the possibility that high anxious and low anxious males and females respond differently in the verbal conditioning situation.

REVIEW OF THE LITERATURE

Anxiety and Verbal Conditioning

Investigations of the effect of anxiety on performance in the verbal conditioning situation have frequently employed a sentence construction task in which the Ss have been required to make up sentences from words presented to them on cards. Thus, Buss and Gerjuoy (1958), Gelfand and Winder (1961), Levin (1961), Spielberger, DeNike, and Stein (1965), and Taffel (1955) had this Ss construct sentences beginning with one of six pronouns and containing a past tense verb. With one exception, all the Ss were hospitalized psychiatric patients.[1] Their anxiety level was determined by their responses to the Taylor (1953) Manifest Anxiety Scale (MAS). In three of the studies the Ss were given an initial 20 unrewarded card-trials followed by 60 reinforced conditioning trials. Spielberger, DeNike, and Stein; and Levin used 80 conditioning trials after 20 unrewarded trials. The initial unreinforced trials given in these and other studies are used to establish the operant response rate prior to conditioning. The reward given in all the studies was a spoken "good" following sentences beginning with either the pronoun "I" or "We." In the experiments by Spielberger, DeNike, and Stein; Buss and Gerjuoy; Levin; and Gelfand and Winder no significant

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[1]Twenty-nine of Levin's 79 patients had medical not psychiatric disorders.

relationship was found between anxiety and conditioning. Taffel, however, reported a positive relation between level of anxiety and conditionability. He found that patients who were either highly anxious or moderately anxious showed significant performance gains over conditioning trials, whereas low-anxiety patients did not. The greatest gains were shown by the highly anxious patients.

The failure to find a significant relation between anxiety and conditionability under similar conditions has also been reported for 'normal' subjects by Daily (1953), Rowley and Keller (1962), and Farber (1963). Both Daily; and Rowley and Keller required their Ss to construct sentences with one of six pronouns and a past tense verb, and rewarded the selection of first person pronouns. The reinforcement consisted of either "good" or "mmm-hmm" (Daily), and either a smile and "good," or a smile and a head nod (Rowley and Keller). Daily gave his Ss 120 rewarded conditioning trials, while Rowley and Keller employed 45 conditioning trials. Farber rewarded his Ss with "good" for using "You" to begin a sentence from four pronouns and a verb. He employed 60 conditioning trials. The MAS was used to assess the level of the Ss' anxiety in all three studies.

Other investigators have employed a sentence construction task but rewarded the selection of a particular class of verbs not pronouns. In three such studies using psychiatric patients, high anxious Ss were found to condition more readily than low anxious. Both Campbell (1960), and Sarason and Campbell (1962) required their Ss to select one of three

pronouns and either a neutral or mildly hostile verb and use them in a sentence. "Good" was the reinforcement for choosing a hostile verb on the last 120 of 140 card-trials. Sarason (1958) asked his Ss to make up two-word sentences using "He" and one of three verbs. Verbal activity verbs were reinforced with "mm-hm" during 140 conditioning trials. The Ss' anxiety level in these studies was determined on the basis of their performance on the Test Anxiety, Lack of Protection, and General Anxiety Scales of Sarason's Autobiographical Survey (Sarason); the General Anxiety Scale of Sarason's Autobiographical Survey (Sarason and Campbell); and the General Anxiety Scale of Sarason's Autobiographical Survey (Campbell).

Campbell (1960), however, failed to find anxiety level associated with differential conditioning when he employed non-patients as Ss and the same task, reinforcement, response class, and scale for assessing anxiety that he used with patients. Similarly, Binder and Salop (1961) failed to obtain significant performance differences between 'normal' Ss scoring high and those scoring low on the Psychasthenia Scale of the Minnesota Multiphasic Personality Inventory. Eriksen and Davids (1955) reported that this scale correlated .92 with the MAS, indicating that the two scales measure largely similar factors. Ss in the Binder and Salop study constructed sentences from one of four pronouns and either a present or past tense verb. Use of the past tense verb was rewarded with "good" during 80 conditioning trials.

In other investigations, tasks other than sentence construction have been employed. Thus, Matarazzo, Saslow, and Pareis (1960) required their Ss to simply say words, while Rogers (1960) used an interview situation. In the former study, "good" or "that's good" was the reward given one group of Ss for saying plural words and another group for 'human' responses during a 200 word-trial conditioning period. No significant difference was found between the MAS scores of conditioners and nonconditioners for either response class. Rogers gave his Ss six ten-minute interviews and use "mm-hm" and a head nod to reinforce one group for making positive self-reference and another group for negative self-references during the last five interviews. Again, the results failed to indicate a significant relation between MAS scores and conditioning

The findings of the relation between anxiety and conditioning obtained in the investigations that have been reviewed, together with the nature of the Ss, tasks, response classes, and number of conditioning trials that were employed, are summarized in Table I. With the exception of the studies by Rowley and Keller (1962) and Campbell (1960) the 'normals' used as Ss were college students. Rowley and Keller employed school children having an average age of ten, while Campbell's Ss were student nurses.

From Table I it is apparent that in the experiments that employed

TABLE I

SUMMARY OF EXPERIMENTS THAT INVESTIGATED THE RELATION BETWEEN ANXIETY AND VERBAL CONDITIONING

Experiment	Task	Response Class	Conditioning Trials	Relation Between Anxiety and Conditioning
Using Patients as Subjects				
Taffel (1955)	Sentence Construction: 1 of 6 Pronouns and Past Tense Verb	I or We	60	+
Buss and Gerjuoy (1958)	Sentence Construction: 1 of 6 Pronouns and Past Tense Verb	I or We	60	0
Gelfand and Winder (1961)	Sentence Construction: 1 of 6 Pronouns and Past Tense Verb	I or We	60	0
Levin (1961	Sentence Construction: 1 of 6 Pronouns and Past Tense Verb	I or We	80	0
Spielberger, DeNike, and Stein (1965)	Sentence Construction: 1 of 6 Pronouns and Past Tense Verb	I or We	80	0
Campbell (1960)	Sentence Construction: 1 of 3 Pronouns and Either Neutral or Mildly Hostile Verb	Hostile Verb	120	+
Sarason and Campbell (1962)	Sentence Construction: 1 of 3 Pronouns and Either Neutral or Mildly Hostile Verb	Hostile Verb	120	+
Sarason (1958)	Sentence Construction: He and 1 of 3 Verbs	Verbal Activity Verbs	140	+

Using 'Normals' as Subjects

Daily (1953)	Sentence Construction: 1 of 6 Pronouns and Past Tense Verb	I or We	120	0
Rowley and Keller (1962)	Sentence Construction: 1 of 6 Pronouns and Past Tense Verb	I or We	45	0
Farber (1963)	Sentence Construction: 1 of 4 Pronouns and Verb	You	60	0
Campbell (1960)	Sentence Construction: 1 of 3 Pronouns and Either Neutral or Mildly Hostile Verb	Hostile Verb	120	0
Binder and Salop (1961)	Sentence Construction: 1 of 4 Pronouns and Either Present or Past Tense Verb	Past Tense Verb	80	0
Matarazzo, Saslow, and Pareis (1960)	Word-Saying	Plural or Human Words	200	0
Rogers (1960)	Ten-Minute Interviews	Positive or Negative Self-References	5 Interviews	0

non-patients as Ss the results consistently indicated no relation between anxiety and verbal conditioning. With patients as Ss, however, the findings are inconsistent, with a positive relation reported in one-half the studies, and no relation in the rest. The reason for the inconsistency in these findings is not readily apparent.

It should be noted that in none of these 15 experiments was there an attempt made to relate the performance of Ss differing in anxiety to the presence of stress in the conditioning situation, the complexity of the response class that was conditioned, or the task-orientation of the S during the conditioning process.

Sex Differences in Performance

Differences in the performance of males and females were examined in the previously cited investigations by Buss and Gerjuoy (1958), Daily (1953), Matarazzo, Saslow, and Pareis (1960), and Rowley and Keller (1962). The trend of the evidence from this research suggests that males and females do not perform differently. Thus, in three of the four studies, no statistically significant sex differences were found. Daily, however, observed that the performance of his male Ss was significantly above the females. There is no readily apparent explanation for this exceptional finding.

Awareness of the Response-Reinforcement Contingency

In the studies by Gelfand and Winder (1961), Rowley and Keller (1962), Sarason (1958), Sarason and Campbell (1962), and Taffel (1955), none of the Ss were found to be aware of the response-reinforcement

contingency that had been employed. Buss and Gerjuoy (1958), furthermore, provide no information on the awareness of their Ss, and presumably made no attempt to assess awareness. Except for Rowley and Keller who had 'normal' school children as Ss, psychiatric patients were used in these studies. It will also be recalled that in every case a sentence construction task was employed and that a particular class of pronouns or verbs was rewarded. With the exception of Gelfand and Winder, the Ss' awareness was determined by a brief interview conducted immediately after the conclusion of the conditioning trials. The interview consisted of four questions in the case of Rowley and Keller; Sarason; and Taffel, while Sarason and Campbell asked five questions. Gelfand and Winder assessed awareness after their Ss had experienced 80 counter-conditioning trials following the initial conditioning. They do not specify the procedure they employed in determining awareness.

Some of the Ss in the experiments by Daily (1953), Binder and Salop (1961), and Rogers (1960), however, were able to state the nature of the response-reinforcement contingency. In order to assess awareness of the pronoun response class, Daily asked four questions. The interview was given after the S had experienced 120 extinction trials and had been asked to write as many of the verbs used in the experiment as he could remember in a three minute period. He reported that 8 of the 80 Ss had become aware. Binder and Salop discovered 11 of 50 Ss were aware that selection of past tense verbs had been rewarded

on the basis of their answers to two questions asked after 60 extinction trials. In both these experiments, the aware Ss were discarded and their data were not included in subsequent analysis. While Rogers did not exclude aware Ss, he found that only 2 of his 24 Ss could be considered to have become aware of the self-reference response class. Awareness was determined by a "structured interview" given after the completion of conditioning. The nature of this interview is not specified.

Furthermore, Spielberger, DeNike, and Stein (1965), Levin (1961), Farber (1963) and Matarazzo, Saslow, and Pareis (1960) reported that a substantial proportion of their Ss had become aware. The findings of Spielberger, DeNike and Stein; and Levin are of particular interest. In the former study, it will be recalled that the investigators employed similar psychiatric patients as Ss, and the same sentence construction task, pronoun response class, and reinforcement as Taffel (1955). After giving 80 conditioning trials, as compared with 60 given by Taffel, they assessed their Ss' awareness by an interview comprised of the same four questions used by Taffel plus a number of additional questions that "became more focused and specific as the interview progressed" (p. 232). On the basis of the first four questions asked by Taffel only 3 of the 31 Ss were classed aware; however, with the more extended interview 10 more were found to be aware. Levin obtained similar results. His procedure was the same as that of Spielberger, DeNike, and Stein except that about one-

third of his Ss were patients with medical not psychiatric disorders and the first four questions he asked in assessing awareness only approximated those used in previous research. Based on these first four questions only 3 of his 60 Ss were classed as being aware. Using the extended interview 16 additional Ss were found to be aware.

The findings in these two experiments suggest that the failure to find any aware Ss in the previously mentioned studies that employed psychiatric patients might be attributable to the insensitivity of their interviewing procedures and not to the fact that all the Ss were not aware.

As previously indicated in the experiments by Farber (1963), and Matarazzo, Saslow, and Pareis (1960) college students were rewarded for selecting a certain pronoun in constructing sentences, and saying plural or 'human' words respectively. Farber reported that 43 of his 120 Ss could be considered aware on the basis of their responses to two questions given on the completion of conditioning. Matarazzo, Saslow, and Pareis, similarly, had their Ss write answers to two questions; however, they did this after experiencing 100 extinction trials. Judges rated the answers on a four point scale from totally unaware to fully aware. It was found that while only 7 of the 80 Ss were fully aware, an additional 45 Ss had some degree of awareness.

Based on the evidence presented in these investigations, it appears that some Ss do become aware of the response-reinforcement

contingency employed by the E. College students seem to be more likely to become aware and/or more likely or better able to verbalize their awareness than psychiatric patients. Furthermore, as emphasized by the findings of Spielberger, DeNike, and Stein (1965), Levin (1961), and Matarazzo, Saslow, and Pareis (1960), the assessment of awareness depends on the sensitivity of the assessment procedure. Some Ss do not reveal their awareness when they are asked a few general questions, nor need they be totally unaware if they cannot explicitly state the response class that was rewarded. It also seems reasonable to assume that awareness is more likely to be discovered if the assessment is made immediately after conditioning. The intervention of a post-conditioning extinction experience perhaps accounts for the failure to find more aware Ss in the experiments by Daily (1953), Binder and Salop (1961), and Matarazzo, Saslow, and Pareis (1960).

Awareness and Anxiety

In the studies by Spielberger, DeNike, and Stein (1965), Levin (1961), and Farber (1963), in which a substantial number of Ss were found to be aware, analyses were carried out to determine whether differences in awareness were significantly related to anxiety level. No such differences were reported.

As previously indicated these investigations also failed to find a significant relation between anxiety and conditionability.

Performance of Aware and Unaware Subjects

In the experiments that compared the performance of aware and unaware Ss, the results consistently indicate that aware Ss showed superior gains in performance. Thus, Spielberger, DeNike, and Stein (1965), and Levin (1961) found that their aware Ss gave significant evidence of conditioning whereas unaware Ss did not differ significantly from a control group. In the former study the controls were randomly reinforced, while Levin gave them no reinforcement during conditioning trials. In both experiments it was also reported that when the Ss were aware of one but not both the rewarded pronouns, the performance increments were specific to the particular pronoun for which they were aware. Farber (1963) found that his aware group conditioned but that the unaware Ss actually decreased in the frequency with which they gave the reinforced response class. Finally, Matarazzo, Saslow, and Pareis (1960) observed that both the number of Ss who conditioned and the magnitude of conditioning was positively related to the degree of awareness.

Except for Spielberger, DeNike, and Stein (1965), none of these investigations provide evidence regarding the effects of anxiety on the conditioning of aware Ss. While both their low anxious and high anxious Ss showed performance gains, Spielberger, DeNike, and Stein reported that the low-anxiety patients gave significantly more conditioned responses than patients higher in anxiety.

Although the evidence obtained in these and other investigations (Kanfer and McBrearty (1961), DeNike and Spielberger (1963), Spielberger, Berger, and Howard (1963), Spielberger and Levin (1962), and Spielberger, Levin, and Shepard (1962)) indicates that aware Ss on the whole show significantly greater improvement than those who are unaware, there are marked individual differences in the extent of this improvement. Some aware Ss do not condition. The differences in the performance of aware Ss have been clearly indicated in the findings obtained by Farber (1963). In addition to the two questions that assessed the extent of awareness, Farber asked a question which ascertained how the Ss reacted to becoming aware. On the basis of their answers, aware Ss were classed as "aware-conforming" ("those who stated or implied that they actually did use the reinforced pronoun more often") and "aware-nonconforming" ("those who indicated that the reward did not affect their behavior") (p. 189). Analysis of their conditioning scores revealed that the two classes of Ss had performed differently. Although on the final 20 of the 60 conditioning trials the nonconformers performed significantly above their initial unrewarded level, Farber noted that, viewed as a whole, their performance resembled that of the unaware Ss more than the aware-conformers.

The experiments by Spielberger, Levin, and Shepard (1962) and Spielberger, Berger, and Kay (1963) should also be noted in this

connection. Both studies employed a sentence construction task in which the Ss were rewarded for using first person pronouns on the last 80 of 100 card-trials. An extensive postconditioning interview was used to assess both the Ss' awareness and attitude toward the reinforcement. With respect to the latter, they were asked specifically whether they had wanted the E to say "good" "very much," "some," or "didn't care one way or the other." In both experiments it was found that aware Ss who wanted the reward "very much" showed the greatest performance gains, while those who wanted it "some" made lesser gains and those who "didn't care" showed only small or no improvement.

On the basis of the findings in these three studies, it appears that the extent to which awareness of the response-reinforcement contingency is accompanied by improved performance is determined by the S's motivation to obtain the reinforcing stimulus. Thus, awareness may be considered to be a mechanism whereby the S can increase or inhibit his responses depending on his motivation to respond. The fact that aware Ss as a group have consistently shown significant performance gains in these studies suggests that many are motivated to obtain the expressions of approval offered by the Es.

Summary

The main findings indicated in the review of the literature may be summarized as follows:

(a) In experiments with non-patients as Ss, the results consistently indicate no relation between anxiety and verbal conditioning.

With psychiatric patients as Ss, however, the findings are inconsistent. Both a positive and no relation between anxiety and conditionability have been found.

No attempt has been made in this research to investigate the relationship between anxiety and stress, response class complexity, or task-orientation.

(b) While the trend of the evidence suggests that males and females do not perform differently, sex differences have been obtained.

(c) On the whole, Ss who become aware of the response-reinforcement contingency show significantly greater performance gains than those who remain unaware. However, some aware Ss do not show an improvement. The extent to which awareness is accompanied by improved performance is determined by the S's motivation to obtain the reinforcing stimulus.

(d) No relation has been found between anxiety and awareness of the response-reinforcement contingency.

(e) In the one study that investigated the effects of anxiety on the conditioning of aware Ss, the findings indicate that low anxious patients gave significantly more conditioned responses than patients higher in anxiety.

PREDICTED OUTCOMES

As previously indicated, the purpose of the present study was to investigate the effect of four variables on the performance of high anxious and low anxious Ss in a verbal conditioning situation. These variables were the complexity of the response class that is reinforced; the presence of stress in the conditioning situation; the performance by the S of task-orienting behavior during the conditioning process; and the sex of the S.

The Ss for the experiment were male and female college students. Anxiety level was determined by their scores on the MAS. The task consisted of sentence construction, with two levels of response class complexity. Ss in the simple response class groups made up sentences from one of six pronouns and a past tense verb. They were rewarded for using the pronouns "I" or "They." Those in the more complex response class groups constructed sentences with one or six pronouns and either a singular or plural noun. The rewarded response class in this case consisted of the pronouns "I" or "They" plus the singular noun. Half the Ss were under stress during conditioning, the other half were not. The stress was induced by presenting loud unexpected noises. Task-orienting behavior consisted of the Ss writing out their sentences after they said them out loud. Half the Ss did this, while the others simply spoke their sentences. The Ss' awareness of the response-reinforcement contingency

and attitude toward the reinforcement were assessed in a detailed interview conducted immediately upon the completion of conditioning.

Based on the response-interference theory of the effect of anxiety on performance, the following predictions were made concerning outcomes in this study.

(i) In the absence of stress in the conditioning situation, there should be no significant differences in the performance of high anxious and low anxious Ss with either the simple or more complex response class.

This finding would be in agreement also with the evidence obtained in the other investigations that employed 'normals' as subjects.

(ii) Introduction of noise-stress into the conditioning situation should affect high anxious and low anxious Ss differently. As previously suggested, with the high anxious it should produce an increase in their general drive level and evoke predominantly task-irrelevant responses that interfere with performance. Among the low anxious, however, it should increase their drive level, although to a lesser extent than in the high anxious Ss, and evoke largely task-relevant responses which facilitate performance.

In view of this, it would be expected that under noise-stress high anxious and low anxious Ss would perform differently, and that the differences would be related to the complexity of the response class. There should be a greater likelihood in the case of the more

complex than the simple response class that the task-irrelevant tendencies of high anxious Ss would offset the facilitative effect of increase drive and disrupt their performance. Although the increase in drive should be less than for high anxious Ss, the evocation of predominantly task-relevant responses should facilitate the performance of low anxious Ss with both the simple and more complex response classes.

(iii) Assuming that the performance of the task-orienting behavior interferes with and minimizes the effect of task-irrelevant tendencies, it should facilitate the performance of both the low anxious Ss and, in particular the high anxious Ss.

In view of the inconsistency in the evidence and the fact that the response-interference theory makes no distinction with respect to sex, no prediction was made concerning sex differences in performance.

On the basis of previous findings, it was predicted that the performance differences that are found would be related to differences in the Ss' awareness of the response-reinforcement contingency, and in their motivation to obtain the reinforcing stimulus.

METHOD

Subjects

Initially, the Taylor MAS and the Lie Scale (LS) from the Minnesota Multiphasic Personality Inventory were administered to a total of 344 students, 158 males and 186 females, enrolled in an introductory course in educational psychology at the University of Alberta. From this larger sample, 64 students were selected to participate in the experiment. One-half of the 64 students were males.

Sixteen of the males and 16 of the females were among the highest scorers on the MAS in the sample, while the other males and females obtained among the lowest scores. More exactly, the MAS scores of the females ranged from 39 to 31 and from 12 to 3, and represented the extreme 14.12% and 15.82% respectively of the scores obtained by the female sample. Similarly, the male Ss' scores varied between 34 and 29 and 10 and 0, and comprised the top 11.49% and bottom 18.92% of the male sample. The high scoring Ss were consequently considered to be highly anxious, while the low scorers were regarded as being low in anxiety. All 64 Ss scored no more than five on the LS.[2]

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[2]The LS was administered to get an indication of the honesty of the students' test responses. An LS score of five or less as a selection criterion was suggested by Dr. W.N. Runquist (Department of Psychology, University of Alberta).

Experimental Design

There were six independent variables in this research:

(1) Anxiety level of Ss - High and Low Anxious.

(2) Complexity of response class - Simple and More Complex.

(3) Task-orientation - Task-Oriented and Not Task-Oriented.

(4) Noise-stress - Noise-stress and No Noise-stress.

(5) Sex of Ss.

(6) Trials - Ss received five blocks of 20 trials.

These variables were considered in a 2x2x2x2x2x5 factorial design. Each of the 32 experimental groups contained two Ss. Placement of the Ss in these groups was made at random.

Although the female Ss scored somewhat above the males on the MAS, no significant differences were found in the scores of the 16 High Anxious (HA) groups ($F = 1.13$, $df = 15/16$, $p > .10$) or the 16 Low Anxious (LA) groups ($F = .36$, $df = 15/16$, $p > .10$). Tables II and III contain a summary of these analyses.

The MAS scores obtained by the Ss are presented in Appendix A.

Materials and Apparatus

The materials and apparatus for the experiment consisted essentially of the following:

(i) A fairly large office desk.

(ii) Three chairs, one of which was 'wired' with two, six volt D.C. horns and a large school bell. The two horns were mounted on

TABLE II

SUMMARY OF ANALYSIS OF VARIANCE OF
MAS SCORES FOR THE 16 HA GROUPS

Source of Variation	Sum of Squares	df	Mean Square	F
Between	114	15	7.60	1.13
Within	108	16	6.75	
TOTAL	222	31		

TABLE III

SUMMARY OF ANALYSIS OF VARIANCE OF
MAS SCORES FOR THE 16 LA GROUPS

Source of Variation	Sum of Squares	df	Mean Square	F
Between	62.97	15	4.18	.37
Within	180.50	16	11.28	
TOTAL	243.47	31		

the topmost support at the back of the chair as close as possible to the sitter's head. The bell was secured to the supporting struts underneath the seat of the chair. Adjustments were made in the horns so that they would make the most raucous sound possible, and a strip of cloth was placed on the bell in order that its clanging sound would not persist.

(iii) Two rectifiers and three push-button switches. The rectifiers were used to convert the A.C. power supplied by an ordinary wall outlet to the D.C. power necessary to operate the horns.

(iv) Two sets of 101 white cards each six inches by four inches. Every card of one set had typed on it the six pronouns "I," "You," "He," "She," "We," and "They" randomly arranged in a line with a past tense verb below. The other set of 101 cards had the same pronouns similarly arranged but with a singular and plural noun in random order in a line below. For both sets the words were centered on the cards, and were of equal intensity because they had been typed with an electric typewriter. The first set of cards was used with Ss in the simple response class groups, while the second set was employed with the more complex response class groups.

All the verbs and nouns that were used on the cards were selected from the Thorndike-Lorge list of 1000 most frequently used words (1944). They occurred only once on a card. The actual verbs and noun-pairs that were employed are presented in Appendix B.

(v) A wooden card-holder and screen. The card-holder provided a convenient means of presenting the cards to the Ss. The cards, answer record sheets, and switches were placed behind the screen. Because of this, the S could not observe the number of cards, the recording of responses, or when E pressed the switches to sound the horns and bell. Figure 1 shows the construction of the screen and card-holder.

(vi) A tape recorder. It was used to record the Ss' responses during the postconditioning interview.

The position of the apparatus and materials during the experiment is indicated in Figure 2.

The 'wired' chair, the two rectifiers, and the switches were used only with Ss who received noise-stress. With the no noise-stress groups this apparatus was removed and the Ss were seated on an ordinary 'unwired' chair.

Procedure in the Conditioning Situation

All of the Ss were tested individually. Prior to the start of the experiment, E spent several minutes chatting with each of the Ss in order to help them feel more at ease in the novel experimental situation. Then the following instructions were given:[3]

"This is an experiment on speech processes which uses a sentence construction task. I will show you some cards like this one (E

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[3]Parts of these instructions were taken from Levin (1961).

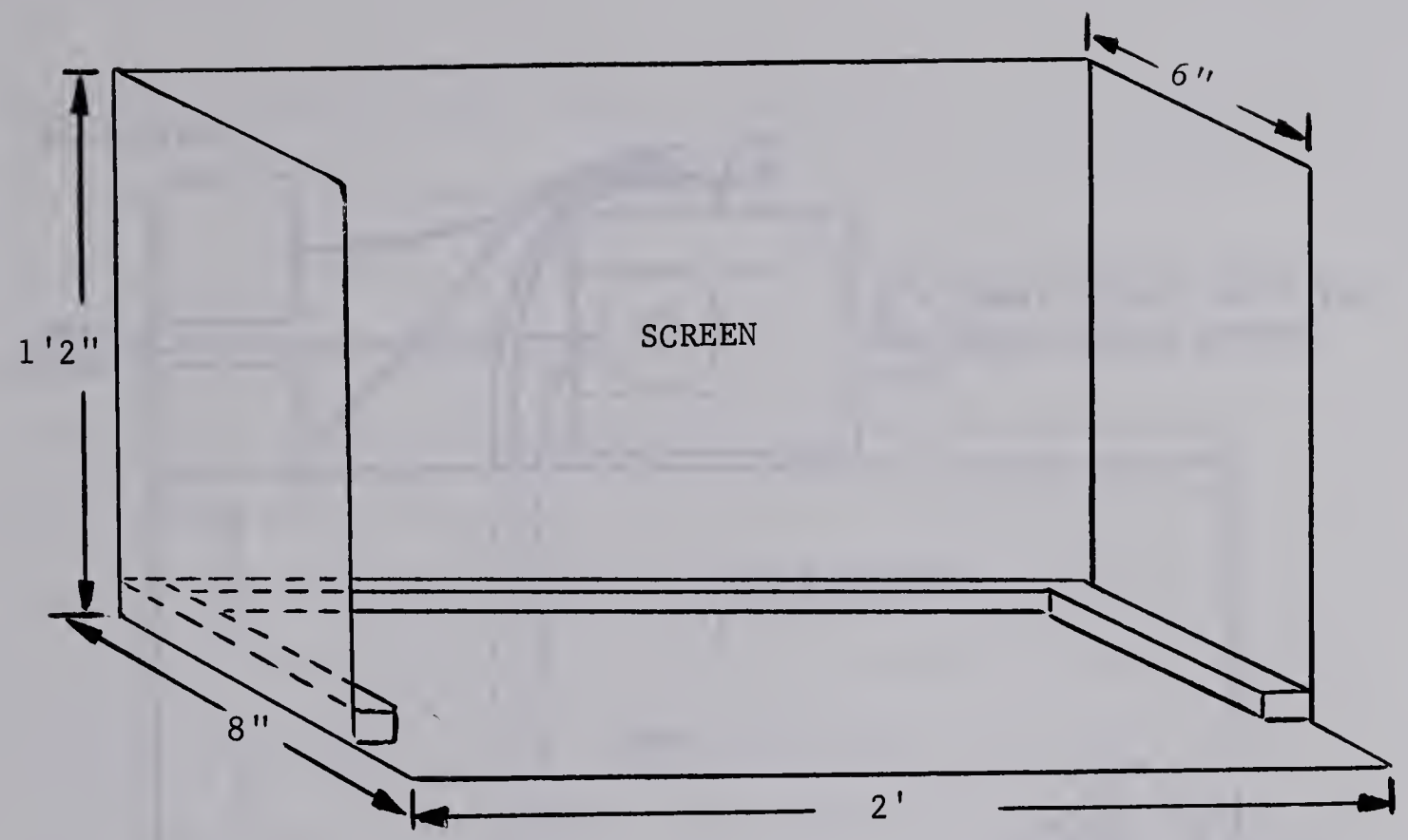


FIGURE 1

CONSTRUCTION OF THE SCREEN AND CARD-HOLDER

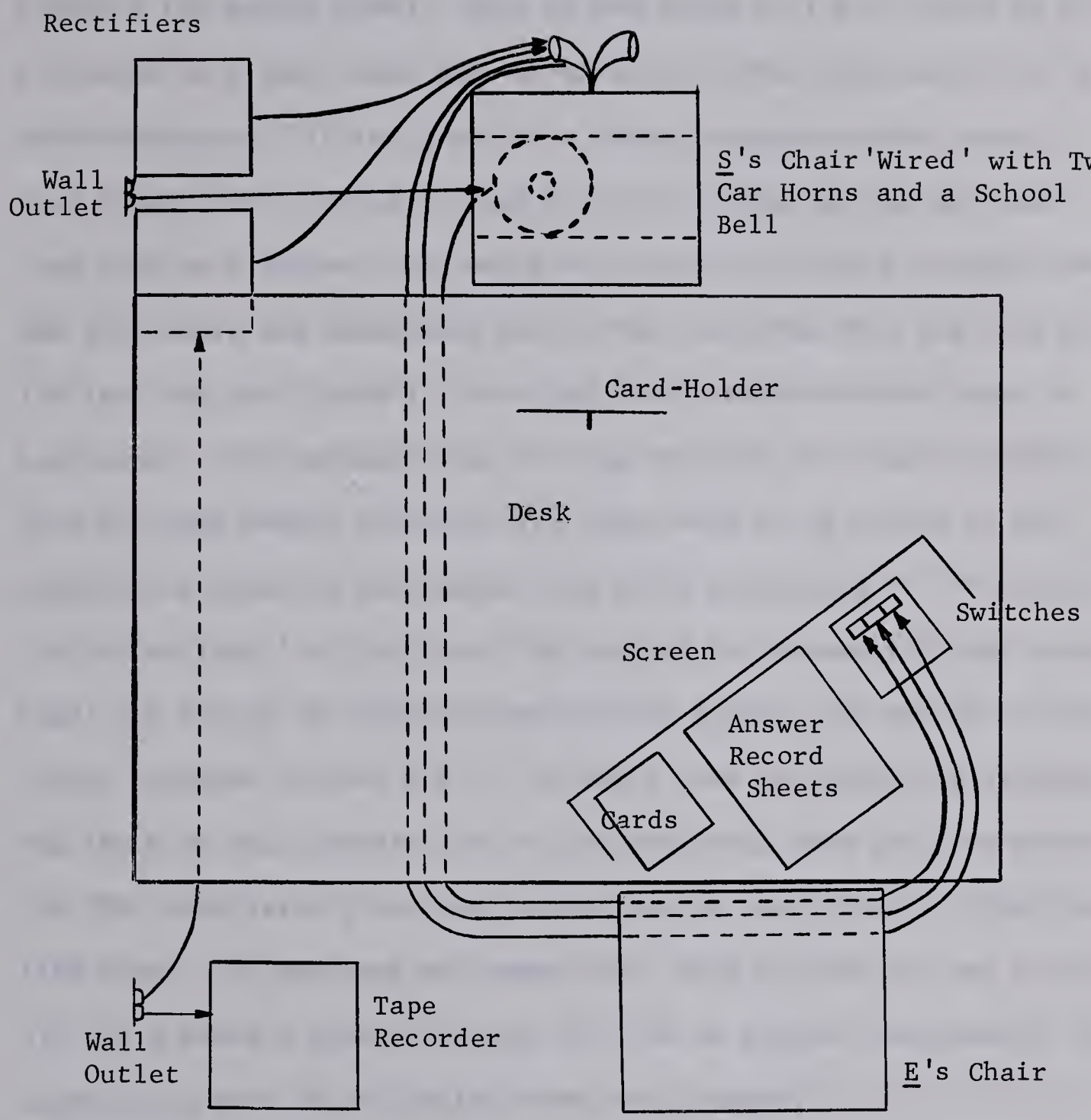
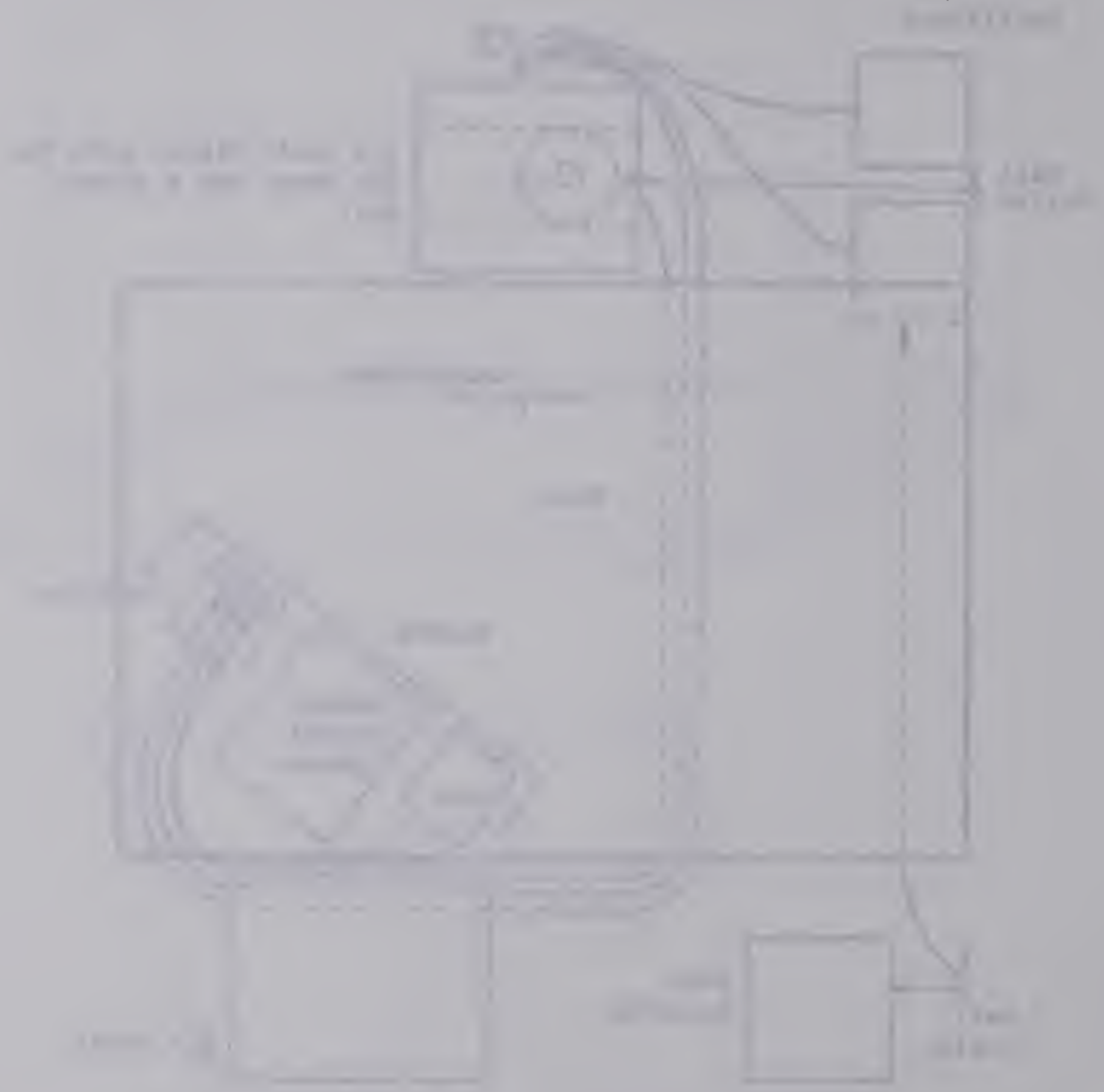


FIGURE 2

POSITION OF APPARATUS AND MATERIALS
DURING THE EXPERIMENT



displays the sample card). Each of the cards will have typed on it six words in a line above and two words in a line underneath (or "a word underneath," if the S was in a simple response class group). What I want you to do is to look at all the words on the card and then make up a sentence beginning with any one of the six words from the line above and containing one of the two words from the line below (or "the word below"). Give the first sentence which comes to your mind. Your sentences may be long or short, it doesn't matter. Here are some sample sentences you might make up (E points to the appropriate words on the sample card while explaining): 'He waited for his arrival,' or this one, "We watched the planes fly high overhead' (or for Ss in simple response class groups, 'We waited as the planes prepared to take off'). In every case say the first sentence you think of that contains one of the two words from the line below (or "the word below") and begins with one of the six words from the line above. Do you have any questions? Tell me what you are to do. (If the S asked a question about the task or replied incorrectly, the appropriate part of the instructions were reread.)

Okay, let's try about 20 sentences for practice. Would you please speak loudly and distinctly so that I can hear what you say."

The appropriate 20 cards were then placed, one after another, on the card-holder before the S and the responses to each card were recorded by E. The order in which the cards were presented to the Ss

never varied. No reinforcement was given for any responses made on these first 20 card-trials in order to establish the Ss' operant response rate.

After the S responded to the twentieth card, E commented "All right, what's fine. Now we'll start." Then, depending on which group the S was in, all or part of the following instructions were read. Thus, Ss who were to be given noise-stress were told:

"Part of this experiment is concerned with the effect of noise on your performance. You may have noticed that two car horns and a large bell are attached to the chair on which you are sitting. Here's how they sound. (E sounds the bell and horns). During the remainder of the experiment, they will be sounded a number of times but you won't be told when to expect the noise. The noises will occur randomly. There will be no connection between what you say and the sounding of the horns and bell. For the remainder of the experiment please keep your hands on the table."[4]

All Ss were given these instructions:

"Continue to make up the sentences as you did before during the practice period. Remember in every case to look at all the card and then say the first sentence you think of that begins with one of the

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[4]Asking the Ss to keep their hands on the table was found to be necessary in a preliminary investigation because a few Ss surrepticiously plugged their ears by resting their head in their hands.

six words from the line above and contains one of the two words from the line underneath (or "the word underneath")."

Ss in task-orienting behavior groups were additionally instructed as follows:

"Would you please keep a record of the sentences you make up in this part of the experiment by writing them down on this sheet of paper with this pencil. (E gives S lined paper and pencil.) First say each sentence out loud and then write it down."

Finally, E concluded to all Ss:

"There will be a lot of cards so let's get started. Remember to speak loudly and distinctly so that I can hear what you say."

Upon completion of the appropriate instructions, each S was shown one after the other, as with the initial 20 cards, the remaining 80 cards, and the responses were recorded by E. Again, the order of presentation of the cards never varied between Ss. However, verbal reinforcement was now given for every appropriate response. In the case of Ss in the simple response class groups the rewarded class of responses included any sentence beginning with either the pronoun "I" or "They." For Ss in the more complex response class groups, only those sentences that began with "I" or "They" and contained the singular noun were reinforced. The reinforcement given all the Ss was either "good" or "that's good" spoken by E in what might be subjectively described as a neutral to warm tone of voice.

Ss in the noise-stress groups were given five soundings of the bell alone and eight of the bell and horns together during the 80 conditioning trials. The position of the 13 soundings among the 80 trials, and the occurrence of the five bell sounds among the 13 soundings were randomly determined. In addition, the position of the sound on a given trial was varied at random, so that on five occasions it occurred before and the other eight times after the S's response. If the response was reinforced, the sound followed the reinforcement. Table IV indicates the trials on which the soundings occurred, the kind of sound given, and the position of the sound in the trial.

The randomness in the presentation of the sounds, and the fact that the screen prevented the Ss from seeing when E pressed the switches to make the sound, insured that the sounds would be unexpected.

In recording the responses made by Ss in the task-oriented groups E simply checked off on a prepared answer sheet the pronouns (and nouns, for those in the more complex response class groups) that were used, while the Ss themselves wrote out the sentences they had given. For Ss who were not task-oriented, E not only checked off the pronouns (and nouns) they used but also wrote out each of their sentences in full. This was done in an attempt to more or less equalize the rate at which the cards were presented to all the Ss.

TABLE IV

POSITION AND NATURE OF THE 13 SOUNDS MADE DURING THE CONDITIONING TRIALS

Trial	Sound	Before or After S's response	Trial	Sound	Before or After S's response
3	Bell	Before	45	Bell	Before
9	Horns and Bell	After	50	Horns and Bell	After
12	Horns and Bell	Before	54	Bell	After
18	Bell	After	61	Horns and Bell	After
27	Horns and Bell	After	69	Horns and Bell	After
31	Horns and Bell	After	75	Bell	Before
37	Horns and Bell	Before			

Postconditioning Interview

Immediately following the completion of the conditioning trials, all Ss were questioned to ascertain the extent of their awareness of the response-reinforcement contingency and the degree to which they wanted to obtain the reinforcement. The questionnaire was taken from Levin (1961) and is presented below.

1. Did you usually give the first sentence which came to your mind?

2. How did you go about deciding which of the words to use?

3. Did you think you were using some of the words more often than others? Which words? Why?

4. What did you think the purpose of this was?

5. What did you think about while going through the cards?

6. While going through the cards did you think that you were supposed to make up your sentences in any particular way?

7. Did you get the feeling that you were supposed to change the way in which you made up your sentences? How?

(If, in answering Questions 1-7, S mentioned the fact that E had said "good" or "that's good," Questions 8-10 were not asked since they were designed to investigate S's awareness of the reinforcer).

8. Were you aware of anything else that went on while you were going through the cards? (If S mentioned "good" or "that's good," Questions 9 and 10 were not asked.)

9. Were you aware of anything about me? (If S mentioned "good" or "that's good," Question 10 was not asked).

10. Were you aware that I said anything? (If S failed to mention "good" or "that's good" in answering this question, the interview was terminated since the remaining questions all refer to S's reaction to the reinforcer).

11. What did my saying "good" (or "that's good") mean to you?

12. Did you try to figure out what made me say "good" (or "that's good") or why or when I was saying "good" (or "that's good")? (If S answered "no," Question 14 followed Question 12).

13. What ideas did you have about what was making me say "good" (or "that's good")?

14. Would you say that you wanted me to say "good" (or "that's good") very much? some? didn't care one way or the other?

15. While going through the cards did you think that my saying "good" (or "that's good") had anything to do with the words that you chose to begin your sentences? What?

If S verbalized a correct contingency at any time during the interview, the above schedule was discontinued and the following question was asked:

Is that something you were actually aware of while going through the cards or is it something you thought of just now?

All Ss who verbalized a correct contingency were also asked Question 14.

The Ss' answers to these questions were recorded in full on the tape recorder.

Following completion of the questionnaire, E asked if the S had heard anything about the experimental procedure prior to taking part in the experiment. All Ss indicated that they had not. The S was then thanked for taking part in the experiment and urged not to speak to any other students about it.

RESULTS

Conditioning Data

For purposes of analysis, the 80 conditioning trials were subdivided into four blocks of 20 trials each. The measure of conditioning was, of course, the number of sentences begun with either "I" or "They" in the case of Ss in the simple response class groups, or for those in the more complex response class groups, the number of sentences begun with "I" or "They" and containing the singular noun. The number of such responses given by each S over the first block of 20 unrewarded trials and the next four blocks of conditioning trials is presented in Appendix C.

In performing an analysis of variance on these data, the nature of the change in the S's performance over the five trial blocks was expressed in a single score. This score indicates the extent and direction of the change and was obtained by fitting a linear curve to the variation in the S's five response totals. Specifically, the score is computed by summing the products of the coefficients for the linear comparison for five subgroups multiplied by the appropriate five response totals. These linear coefficients are -2, -1, 0, 1, and 2 (Winer, 1962, p. 656). Thus, the S's converted score is the sum of the products of -2 multiplied by the first trial block response total, -1 multiplied by the second trial block response total, 0 multiplied by the third trial block total, 1 multiplied by the

fourth trial block total, and 2 multiplied by the fifth trial block total.[5]

The data for the analysis, therefore, were arranged in the form of a 2^5 factorial plan with two observations in each of the 32 cells. Table V indicates the converted scores used in the analysis. Each Ss score was raised by 15 in order to eliminate negative values.

The results of the analysis of variance are summarized in Table VI. The analysis was carried out by the simplified procedure specified by Winer (1962, pp. 283-287). Inspection of the F ratios suggests that the main effect for sex is highly significant ($F = 7.67$, $df = 1/32$, $p < .01$), and that two of the interactions, response class complexity x sex and noise-stress x anxiety x sex, approach significance (F complexity x sex $= 2.90$, $df = 1/32$, $p < .10 > .05$; F noise x anxiety x sex $= 3.33$, $df = 1/32$, $p < .10 > .05$). All the other effects have F's at beyond the .10 level.

No additional effects were found to be significant when analyses of variance were carried out with the data collapsed over noise-stress, response class complexity, or task-orientation treatments. The results of these three analyses are summarized in Appendix D.

The highly significant effect for sex indicates that there was a

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[5]The use of such scores rather than the five trial block response totals in the statistical analysis was suggested by Dr. J. Ogilvy (Department of Psychology, University of Toronto) in a personal conversation.

TABLE V

CONVERTED SCORE FOR EACH SUBJECT USED IN ANALYSIS OF VARIANCE OF CONDITIONING DATA

	High Anxious							
	Females				Males			
	Task-Oriented		Not Task-Oriented		Task-Oriented		Not Task-Oriented	
	Simple	Complex	Simple	Complex	Simple	Complex	Simple	Complex
Noise-Stress	23	12	21	19	3	7	8	10
	24	24	13	11	24	22	25	18
No Noise-Stress	23	32	34	23	13	14	16	24
	42	28	40	27	11	23	22	8

	Low Anxious							
	Females				Males			
	Task-Oriented		Not Task-Oriented		Task-Oriented		Not Task-Oriented	
	Simple	Complex	Simple	Complex	Simple	Complex	Simple	Complex
Noise-Stress	58	20	9	13	0	24	9	23
	11	19	31	18	15	13	16	12
No Noise-Stress	10	26	32	16	1	23	10	24
	14	26	16	13	16	27	32	12

TABLE VI

SUMMARY OF ANALYSIS OF VARIANCE OF CONVERTED SCORES FOR SUBJECTS CLASSIFIED ACCORDING TO SEX, ANXIETY, RESPONSE CLASS COMPLEXITY, NOISE-STRESS, AND TASK-ORIENTATION CONDITIONS

Source of Variation	Sum of Squares	df	Mean Square	F
N (Noise)	236.39	1	236.39	
C (Complexity)	1.89	1	1.89	
T (Task-Orientation)	8.26	1	8.26	
A (Anxiety)	47.26	1	47.26	
S (Sex)	777.02	1	777.02	7.67*
NC	23.77	1	23.77	
NT	62.02	1	62.02	
NA	185.64	1	185.64	
NS	13.14	1	13.14	
CT	206.64	1	206.64	
CA	74.39	1	74.39	
CS	293.27	1	293.27	2.90**
TA	1.89	1	1.89	
TS	123.77	1	123.77	
AS	83.27	1	83.27	
NCT	276.39	1	276.39	
NCA	34.52	1	34.52	
NCS	13.14	1	13.14	
NTA	5.64	1	5.64	
NTS	37.52	1	37.52	
NAS	337.64	1	337.64	3.33**
CTA	23.77	1	23.77	
CTS	23.77	1	23.77	
CAS	26.27	1	26.27	
TAS	6.89	1	6.89	
NCTA	50.77	1	50.77	
NCTS	47.26	1	47.26	
NCAS	92.64	1	92.64	
NTAS	6.89	1	6.89	
CTAS	1.89	1	1.89	
NCTAS	11.39	1	11.39	
Within Cell Error	3241.50	32	101.30	
TOTAL	6376.51	63		

*$p < .01$

**$p < .10 > .05$

considerable difference in the average performance of the males and females. Examination of Table V indicates that this difference is in favor of the females. The sums of the cell totals for the HA and LA females are 396 and 332 respectively, for a combined total of 728. This compares with totals of 248 for HA males and 257 for LA males, or 505 taken together.

Figure 3 depicts this sex difference in performance over the five blocks of trials.

It is evident that the female Ss showed considerable improvement in the total number of 'correct' responses they gave over trials, whereas the males' performance did not improve. This sex x trials interaction, along with the main effect for trials, were found to be highly significant in an analysis of variance for repeated measures on the same Ss (F trials = 7.77, df = 4/248, $p < .0005$; F sex x trials = 4.24, df = 4/248, $p < .005$). The results of this analysis are summarized in Table VII.

The significance of the sex x response class complexity interaction indicates that the difference in the performance of the males and females depends on the level of complexity of the response class that is used. The profiles corresponding to this interaction effect are shown in Figure 4. Inspection of the profiles reveals that the performance of the females is superior to the males under both response class conditions, but particularly with the simple response class. However, whereas the males show an improvement from the simple

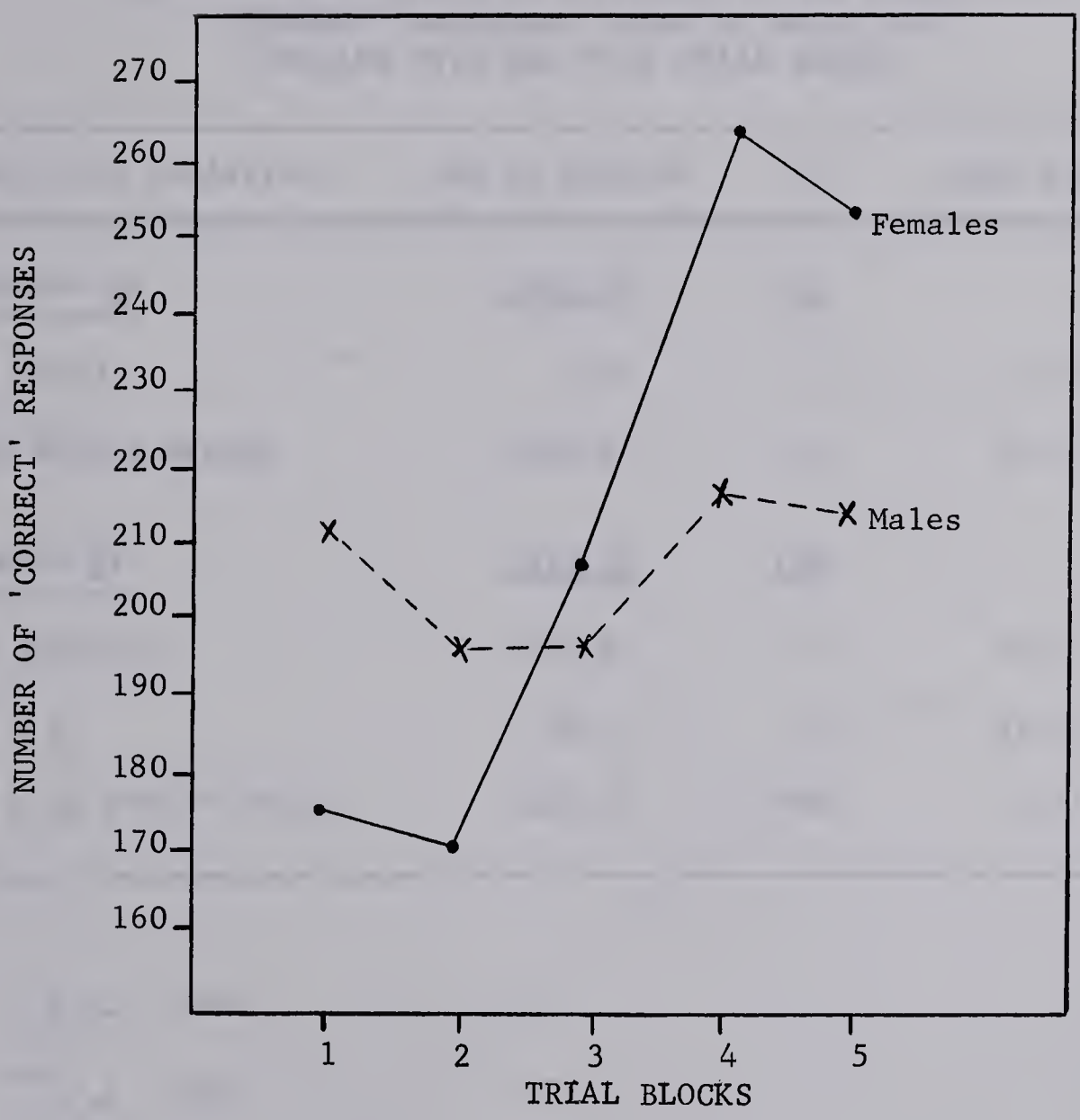


FIGURE 3

NUMBER OF 'CORRECT' RESPONSES GIVEN BY MALES
AND FEMALES OVER THE FIVE TRIAL BLOCKS

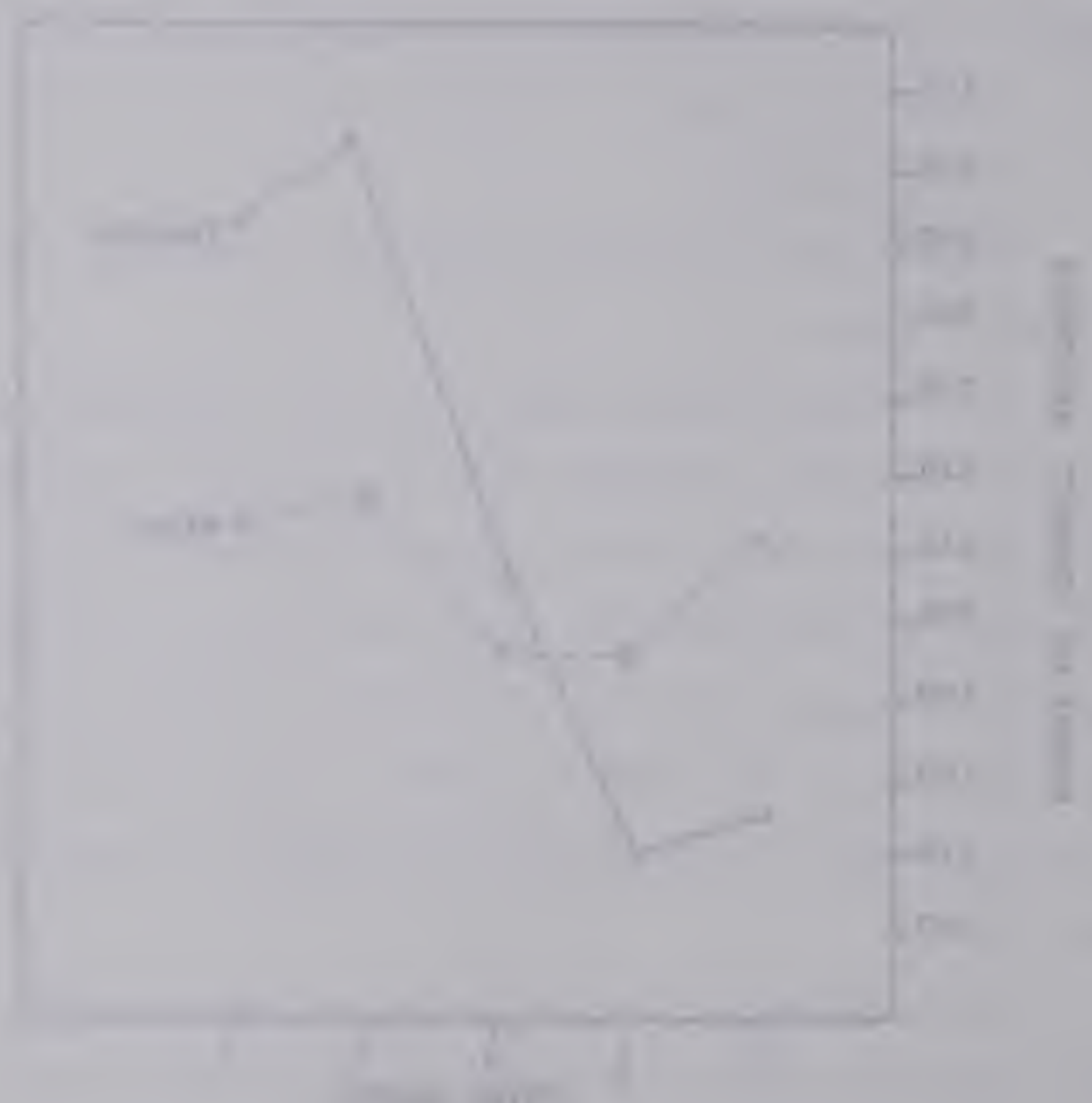


TABLE VII

SUMMARY OF ANALYSIS OF VARIANCE OF THE NUMBER OF 'CORRECT' RESPONSES GIVEN BY MALES AND FEMALES OVER THE FIVE TRIAL BLOCKS

Source of Variation	Sum of Squares	df	Mean Square	F
Between Ss	2943.29	63		
A (Sex)	4.05	1	4.05	.09
Ss Within Groups	2939.24	62	47.41	
Within Ss	1513.20	256		
B (Trials)	158.83	4	39.71	7.77*
A x B	86.74	4	21.69	4.24**
B x Ss Within Groups	1267.63	248	5.11	

*$p < .0005$

**$p < .005$

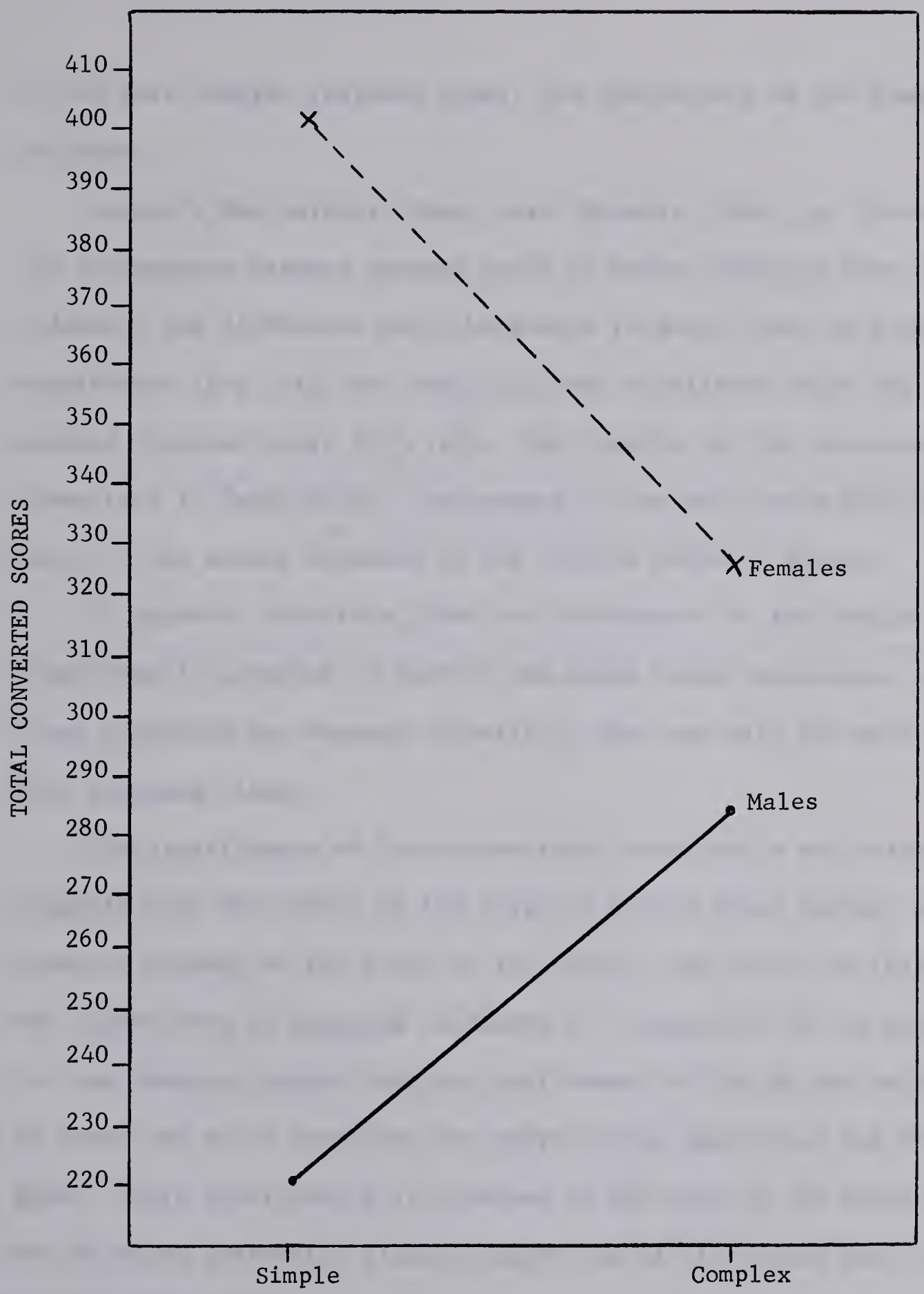
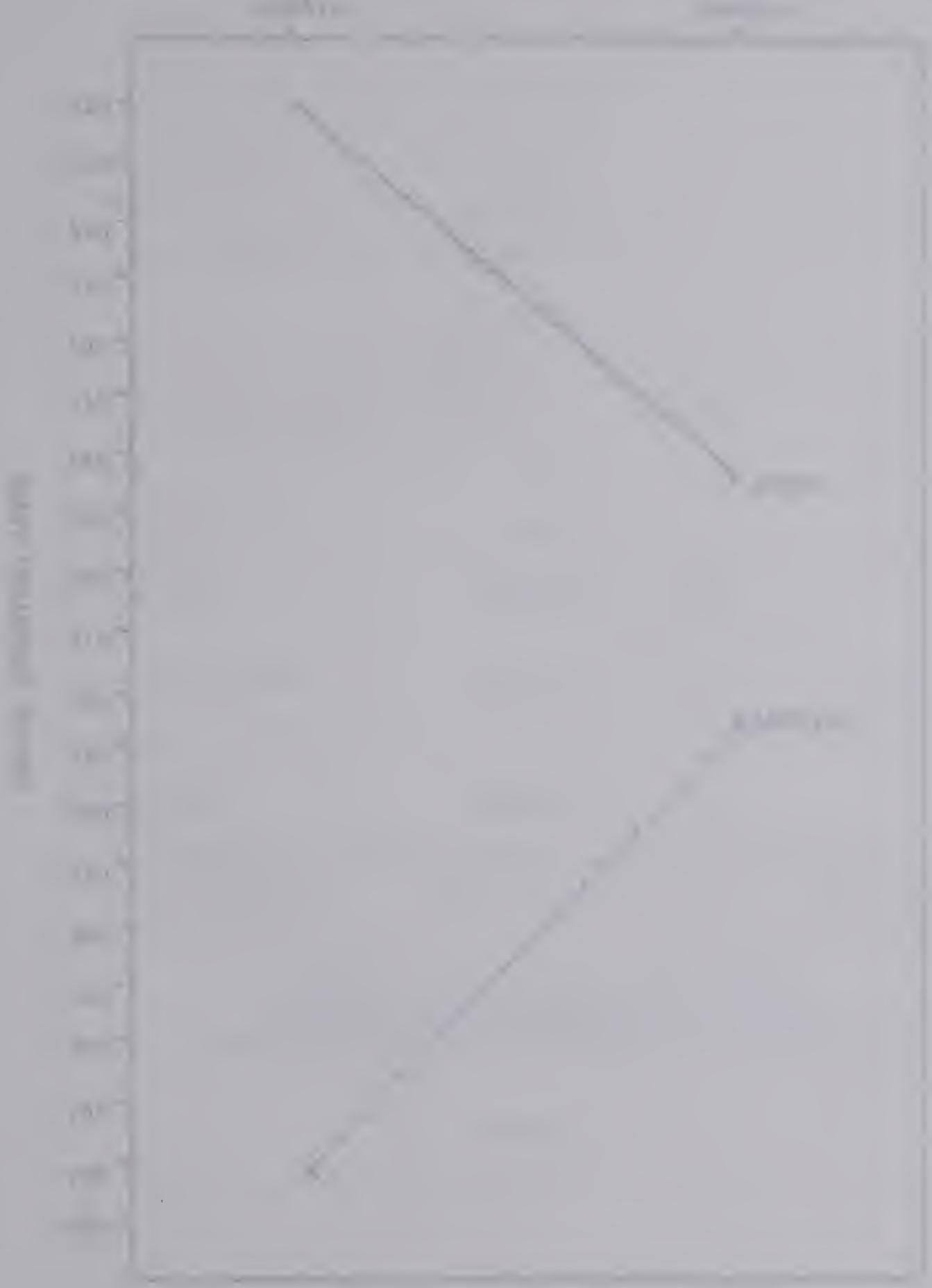


FIGURE 4

TOTAL CONVERTED SCORES FOR THE SEX x RESPONSE CLASS COMPLEXITY INTERACTION



to the more complex response class, the performance of the females declines.

Duncan's New Multiple Range test (Edwards, 1960, pp. 136-140) of the differences between ordered pairs of means indicated that the considerable sex difference with the simple response class is highly significant ($p < .01$), but that it is not significant with the more complex response class ($p > .10$). The results of this test are summarized in Table VIII. The numbers in the table show the differences in the scores obtained by the various pairs of groups.

It appears, therefore, that the performance of the females is significantly superior to that of the males under the simple response class condition but becomes essentially the same with the more complex response class.

The significance of the noise-stress x anxiety x sex interaction suggests that the effect of the level of two of these factors on performance depends on the level of the third. The nature of this three-way interaction is depicted in Figure 5. Inspection of the profiles for the females reveals that the performance of the HA was below the LA under the noise condition but above the LA when noise was not given. This relationship is reversed in the case of the males with the HA males performing slightly above the LA with noise but below the LA without noise.

The results of Duncan's New Multiple Range test conducted on

TABLE VIII

SUMMARY OF THE RESULTS OF DUNCAN'S NEW MULTIPLE RANGE TEST OF GROUP DIFFERENCES EVIDENT IN THE SEX x RESPONSE CLASS COMPLEXITY INTERACTION

Groups	(1)	(2)	(3)	(4)
(1) Simple - Males	-	63	106**	180*
(2) Complex - Males		-	43	117**
(3) Complex - Females			-	74
(4) Simple - Females				-

*$p < .01$

**$p < .10 > .05$

No Asterisks $p > .10$

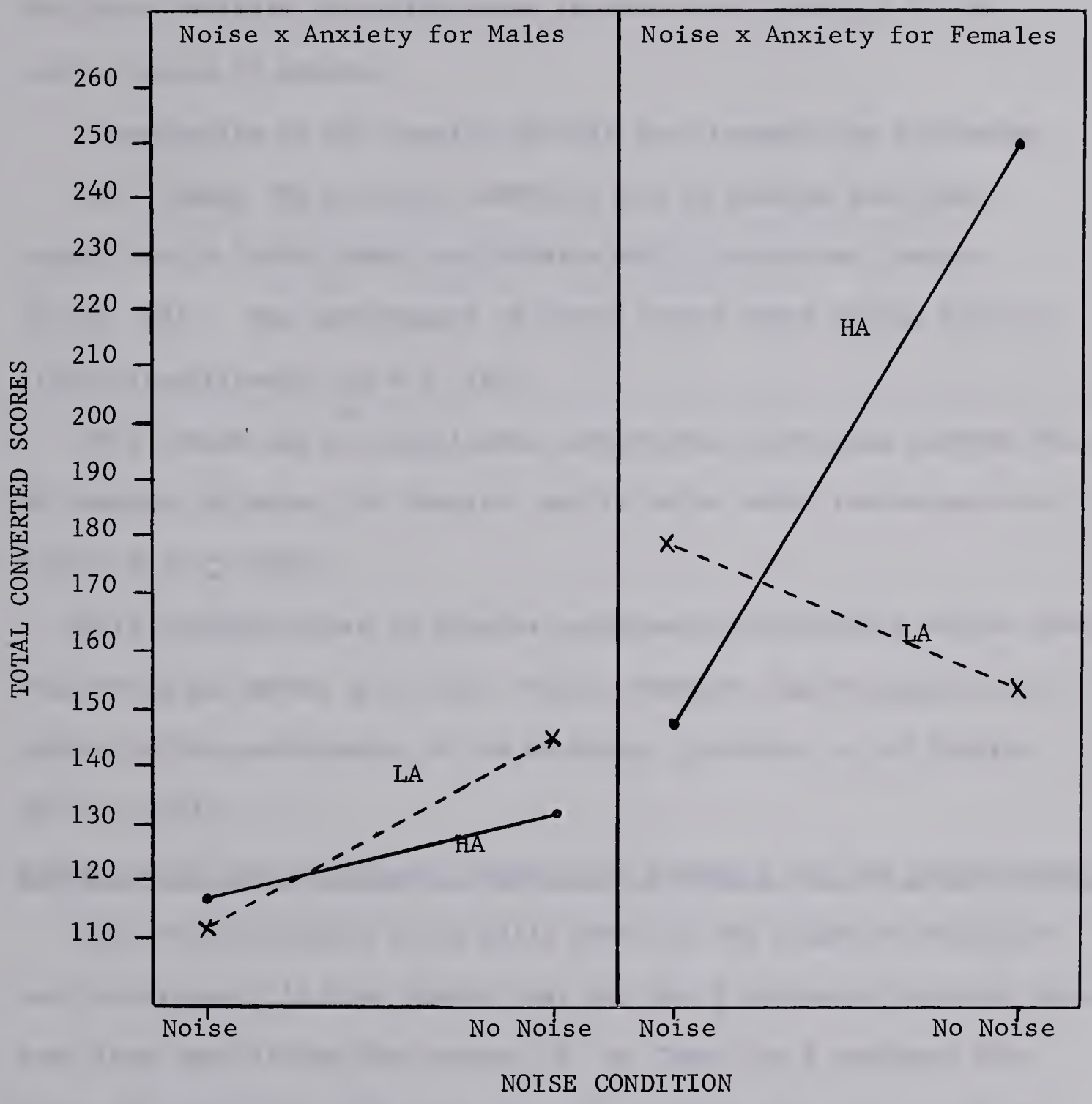
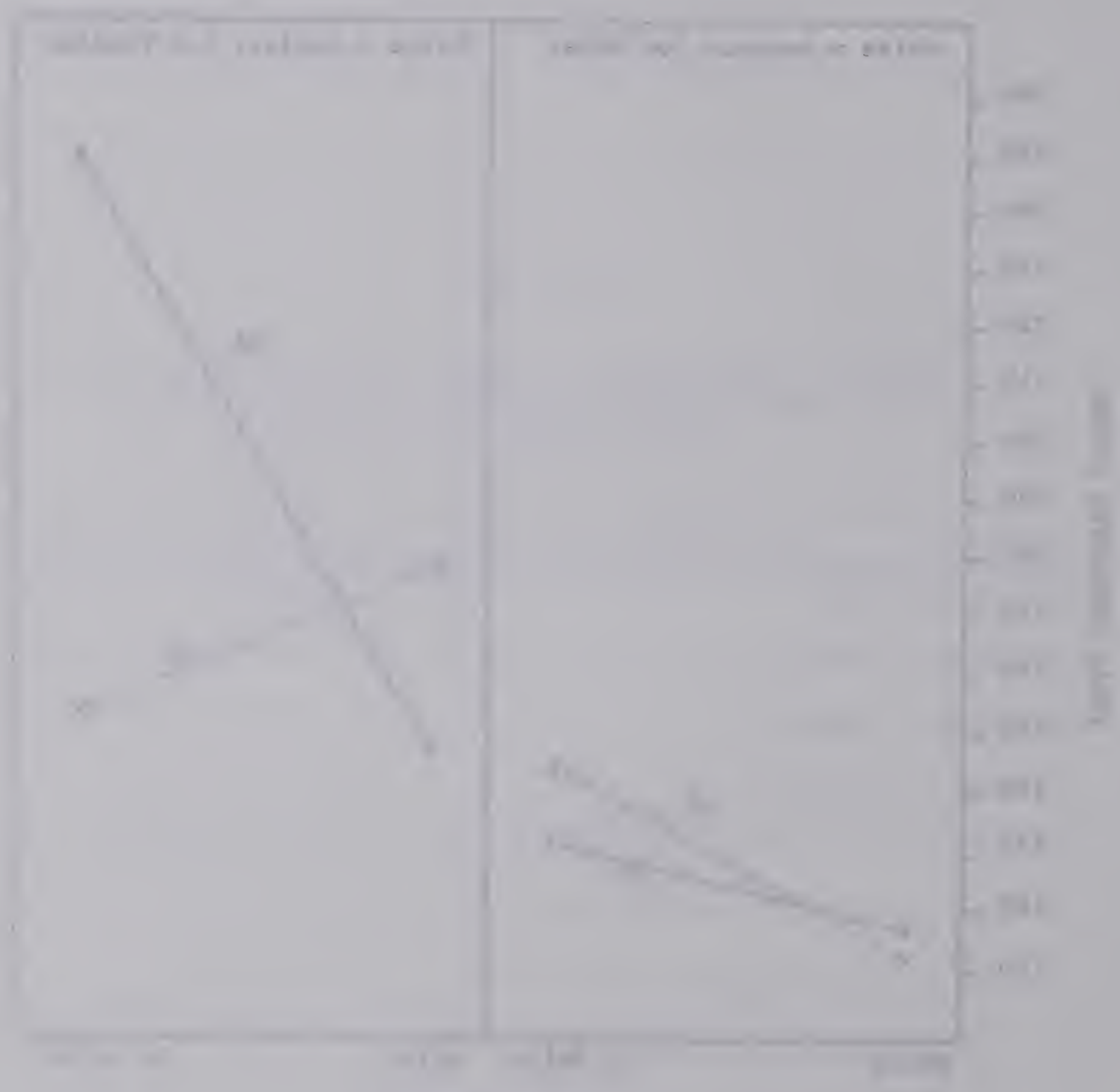


FIGURE 5

TOTAL CONVERTED SCORES FOR THE NOISE x ANXIETY x SEX INTERACTION



these group differences are presented in Table IX. The numbers in the table indicate the differences in the scores obtained by the various pairs of groups.

Examination of the results of this test reveals the following:

(i) Under the no noise condition the HA females performed significantly better than the HA males and LA males and females (p's $< .05$). The performance of these latter three groups did not differ significantly (p's $> .10$).

(ii) There was no significant performance difference between the HA females, HA males, LA females, and LA males under the noise condition (p's $> .10$).

(iii) Without noise HA females performed significantly better than when noise was given ($p < .05$). Noise, however, had no significant effect on the performance of the HA males, LA males, or LA females (p's $> .10$).

Awareness of the Contingency between the Response and the Reinforcement

Ss were considered to be fully aware of the response-reinforcement contingency if they stated that (a) the E expressed approval whenever they used either the pronoun "I" or "They" in a sentence (for those in simple response class groups), or when they used either "I" or "They" together with a singular noun (for those in the more complex response class groups), and (b) they became aware of this during the conditioning trials and not afterwards during the interview.

It was found that 23 of the 32 Ss in the simple response class

TABLE IX

SUMMARY OF THE RESULTS OF DUNCAN'S NEW MULTIPLE RANGE TEST OF GROUP DIFFERENCES EVIDENT IN THE NOISE x ANXIETY x SEX INTERACTION

Groups	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) LA Males-Noise	-	5	19	33	35	41	67	137***
(2) HA Males-Noise		-	14	28	30	46	62	132***
(3) HA Males-No Noise			-	14	16	22	48	118**
(4) LA Males-No Noise				-	2	8	34	104**
(5) HA Females-Noise					-	6	32	102**
(6) LA Females-No Noise						-	26	96**
(7) LA Females-Noise							-	70*
(8) HA Females-No Noise								-

***$p < .01$

**$p < .05 > .01$

*$p < .10 > .05$

No Asterisks $p > .10$

groups became fully aware. By comparison, none of the Ss in the more complex response class groups indicated that they were fully aware. However, 9 of these Ss might be considered to have become partially aware since, although they did not indicate the relevance of the singular nouns, they did state that approval followed sentences beginning with either "I" or "They." Presumably these 9 Ss would have a greater likelihood of making a rewarded response than those who had not made this discrimination.

Table X contains the distribution of the aware Ss in the 32 experimental groups.

Performance of the Aware and Unaware Males and Females in the Two Anxiety Groups

From Table X it is evident that 7 HA females, 7 HA males, 4 LA females, and 5 LA males became fully aware of the simple response class. Similarly, 3 HA females, 2 HA males, 3 LA females, and 1 LA male were partially aware of the more complex response class.

Table XI provides a comparison of the performance of the aware and unaware males and females in the two anxiety groups over the five blocks of trials. Both fully and partially aware Ss are included in the aware groups. Inspection of the data in this table reveals the following:

(i) Aware HA females showed a substantial increase over their initial response level over the four blocks of conditioning trials.

TABLE X

DISTRIBUTION OF AWARE SUBJECTS IN THE 32 EXPERIMENTAL GROUPS

	High Anxious							
	Females				Males			
	Task-Oriented		Not Task-Oriented		Task-Oriented		Not Task-Oriented	
	Simple	Complex	Simple	Complex	Simple	Complex	Simple	Complex
Noise-Stress	2	0	1	0	2	1	2	0
No Noise-Stress	2	2	2	1	2	0	1	1

	Low Anxious							
	Females				Males			
	Task-Oriented		Not Task-Oriented		Task-Oriented		Not Task-Oriented	
	Simple	Complex	Simple	Complex	Simple	Complex	Simple	Complex
Noise-Stress	2	1	1	1	1	0	1	1
No Noise-Stress	0	1	1	0	2	0	1	0

TABLE XI

NUMBER OF 'CORRECT' RESPONSES GIVEN OVER THE FIVE TRIAL BLOCKS BY AWARE AND UNAWARE MALES AND FEMALES IN THE TWO ANXIETY GROUPS

	Trial Blocks		1	2	3	4	5
HA	Males	Aware (n = 9)	75	77	74	72	77
		Unaware (n = 7)	32	27	31	36	31
	Females	Aware (n = 10)	53	75	91	117	102
		Unaware (n = 6)	32	26	31	32	37
LA	Males	Aware (n = 6)	43	43	48	45	43
		Unaware (n = 10)	61	51	43	64	62
	Females	Aware (n = 7)	41	32	48	54	64
		Unaware (n = 9)	50	37	36	61	50

Specifically, they made successive improvements of 22, 38, 64, and 49 responses. On the other hand, the performance of the unaware HA females remained essentially the same over the five blocks of trials.

Analysis of variance for repeated measures on the same Ss indicated that the gain in performance of the aware HA females was highly significant ($F = 13.40$, $df = 4/36$, $p < .0005$). A summary of this analysis is presented in Table XII.

(ii) Aware LA females, after a decline on the first block of conditioning trials, showed increases of 17, 13, and 23 responses over their initial level on the next three trial blocks. By comparison, the only such increase shown by the unaware LA females was on trial block four where they gave 11 more responses. On trial blocks two and three they made 13 and 14 responses below their initial rate, while on the last trial block they gave the same number.

The improvement in performance of the aware LA females, however, was not found to be statistically significant ($F = 1.48$, $df = 4/24$, $p > .10$). Table XIII contains a summary of this analysis. The finding of no statistical significance seems to be attributable to the fact that the improvement was largely due to the atypical performance of 2 of the 7 Ss in this group. Taken separately, these two Ss showed successive gains of 14, 18, and 21 responses over their initial level on the last three trial blocks. By comparison, the other five Ss made 30, 21, 23, 25, and 32 responses over the five blocks of trials.

TABLE XII

SUMMARY OF ANALYSIS OF VARIANCE OF THE NUMBER OF 'CORRECT' RESPONSES GIVEN BY AWARE HA FEMALES OVER THE FIVE TRIAL BLOCKS

Source of Variation	Sum of Squares	df	Mean Square	F
Between Ss	489.52	9		
Within Ss	407.60	40		
Trial Blocks	243.92	4	60.98	13.40*
Residual	163.68	36	4.55	
Total	897.12	49		

*$p < .0005$

TABLE XIII

SUMMARY OF ANALYSIS OF VARIANCE OF THE NUMBER OF 'CORRECT' RESPONSES GIVEN BY AWARE LA FEMALES OVER THE FIVE TRIAL BLOCKS

Source of Variation	Sum of Squares	df	Mean Square	F
Between Ss	427.77	6		
Within Ss	345.20	28		
Trial Blocks	85.26	4	21.32	1.48*
Residual	259.94	24	14.44	
Total	772.97	34		

*$p > .10$

(iii) The aware and unaware groups of HA and LA male Ss showed little, if any, improvement over their initial response level on the four blocks of conditioning trials.

It seems that the only group to give evidence of conditioning was the aware HA females. The groups of unaware HA females, aware and unaware HA males, aware and unaware LA females, and aware and unaware LA males did not appear to condition.

Effect of Level of Motivation to Obtain the Reinforcement on the Performance of Aware and Unaware Ss

It will be recalled that an attempt was made in the postconditioning interview to ascertain how much the Ss wanted to obtain the expression of E approval used in conditioning. Each was asked to state whether he or she wanted it "very much," "some," or "didn't care one way or the other". Those who said they wanted the approval "very much" or "some" were classed as motivated, while those who indicated they "didn't care" were regarded as unmotivated.

Table XIV presents the proportion of aware and unaware Ss at the two anxiety levels who were motivated. Males and females are considered separately. From this table it may be noted that the HA females with 12 out of 16 had a higher proportion of motivated Ss than the other groups. They are followed by the LA females with 8 of 16, the HA males with 6 of 16, and the LA males with 5 of 16. A chi-square test of independence indicated that the differences in

TABLE XIV

PROPORTION OF AWARE AND UNAWARE MALES AND FEMALES IN THE TWO ANXIETY GROUPS WHO WERE MOTIVATED

			Proportion Motivated
HA	Males	Aware	3/9
		Unaware	3/7
	Females	Aware	6/10
		Unaware	6/6
LA	Males	Aware	1/6
		Unaware	4/10
	Females	Aware	3/7
		Unaware	5/9

motivation between these groups were not significant ($x^2 = .42$; x^2 .90 (1 df) = 2.71).

The effect of awareness and motivation on performance is shown in Table XV. The aware groups include both fully and partially aware Ss. Inspection of the data in this table reveals the following:

(i) Aware-motivated Ss made successive improvements over their initial response level of 13, 32, 60, and 59 responses on the four blocks of conditioning trials. Analysis of variance for repeated measures on the same Ss indicated that this gain in performance was highly significant ($F = 6.26$, df = 4/48, $p < .0005$). Table XVI summarizes this analysis.

(ii) Aware-unmotivated Ss, after making the same number of responses on the first block of conditioning trials, showed increases of 17, 16, and 15 responses over their initial level on the next three trial blocks. Analysis of variance for repeated measures on the same Ss, however, failed to indicate any statistically significant difference in performance over the five trial blocks ($F = .85$, df = 4/72, $p > .10$). The results of this analysis are presented in Table XVII.

(iii) Unaware-motivated Ss showed no consistent improvement over their initial response level. Although on trial block four they gave 23 more responses, on trial blocks two and three they responded below their initial rate and on the last trial block they made about the same number of responses.

TABLE XV

NUMBER OF 'CORRECT' RESPONSES GIVEN OVER THE FIVE TRIAL BLOCKS BY THE AWARE MOTIVATED AND UNMOTIVATED GROUPS AND THE UNAWARE MOTIVATED AND UNMOTIVATED GROUPS

Trial Blocks		1	2	3	4	5
Aware	Motivated (n = 13)	71	84	103	131	130
	Unmotivated (n = 19)	141	141	158	157	156
Unaware	Motivated (n = 17)	76	59	62	99	81
	Unmotivated (n = 14)	86	70	65	84	86

TABLE XVI

SUMMARY OF ANALYSIS OF VARIANCE OF THE NUMBER OF 'CORRECT' RESPONSES GIVEN BY AWARE-MOTIVATED SUBJECTS OVER THE FIVE TRIAL BLOCKS

Source of Variation	Sum of Squares	df	Mean Square	F
Between Ss	817.78	12		
Within Ss	649.20	52		
Trial Blocks	222.67	4	55.67	6.26*
Residual	426.53	48	8.89	
TOTAL	1466.98	64		

*$p < .0005$

TABLE XVII

SUMMARY OF ANALYSIS OF VARIANCE OF THE NUMBER OF 'CORRECT' RESPONSES GIVEN BY AWARE-UNMOTIVATED SUBJECTS OVER THE FIVE TRIAL BLOCKS

Source of Variation	Sum of Squares	df	Mean Square	F
Between Ss	660.88	18		
Within Ss	359.60	76		
Trial Blocks	16.27	4	4.07	.85*
Residual	343.33	72	4.77	
TOTAL	1020.48	94		

*$p > .10$

(iv) The unaware-unmotivated Ss showed no gain over their initial response level on any of the four blocks of conditioning trials.

It seems that the only Ss who showed a significant improvement in their performance over the conditioning trials were those who were both aware and motivated to obtain the reinforcement. Ss who were aware but unmotivated, or who were motivated but unaware, or who were neither aware nor motivated gave no evidence of conditioning.

DISCUSSION

Effect of Awareness and Motivation on Performance

In this investigation, Ss who were either fully or partially aware of the response-reinforcement contingency and who indicated that they wanted to obtain the reinforcement gave significant evidence of conditioning. Those who were aware but didn't care about the reinforcement, or who were motivated but unaware, or who were neither aware nor motivated did not condition.

This finding that improved performance is determined both by the Ss' awareness and their motivation to respond had been predicted. It is consistent with the results obtained by Farber (1963), Spielberger, Berger, and Howard (1963), and Spielberger, Levin, and Shepard (1962). Farber, it may be recalled, found that those aware Ss who stated that the reinforcement did not affect their behavior performed more like unaware Ss than aware Ss who indicated that they had used the rewarded response class more often. This latter group made significant performance gains, whereas the unaware Ss did not condition. Similarly, in the Spielberger, Berger and Howard; and Spielberger, Levin, and Shepard studies it was reported that aware Ss who wanted the reinforcement "very much" showed the greatest performance gains while those who "didn't care" made only small or no improvement. The unaware Ss did not condition.

Performance of the Aware HA and LA Males and Females

An interesting finding in this study was that the HA females were the only group among the aware Ss to give evidence of conditioning. The aware HA males and LA males and females, like the unaware Ss, showed no significant improvement over the conditioning trials. This difference in the performance of the HA females may be attributable to the fact that they were more motivated to obtain the reinforcement, although the difference in motivation between the groups was not found to be statistically significant. The failure to obtain a significant difference may be the result of the small number of Ss in the groups.

There are many plausible explanations that might be suggested to account for this sex x anxiety interaction in the performance of the aware Ss; however, there is nothing in the evidence obtained in this study that would support one explanation over another. Furthermore, there does not appear to be any evidence available from other investigations on the effect of sex differences and anxiety on the conditioning of aware Ss.

Although, as previously indicated, Spielberger, DeNike, and Stein (1965) related anxiety to the performance of aware Ss, they did not consider sex differences since all their Ss were males. In opposition to the findings of this study, they reported that both the aware LA males and those higher in anxiety conditioned, and that the performance of the LA was significantly superior to the HA. These contradictory results may be due to the differences in procedure, and the

fact that Spielberger, DeNike, and Stein employed psychiatric patients as Ss. It seems reasonable to assume that such Ss might respond differently to the conditioning situation than would college students. This assumption is supported by the finding in Campbell's study (1960) of a significant relation between anxiety and conditionability with psychiatric patients but no such relationship with an identical response class and reinforcement in the case of non-patient Ss.

Buss and Gerjuoy (1958), Daily (1953), Matarazzo, Saslow, and Pareis (1960), and Rowley and Keller (1962) also investigated the effect of sex differences on performance. However, they made no distinction with respect to awareness. It may be recalled that in three of the studies none of the Ss were considered aware, while Matarazzo, Saslow, and Pareis did not relate performance to awareness although they found a substantial number of aware or partially aware Ss. Only Daily reported a significant sex difference in performance. One cannot say whether the findings obtained in these investigations were the result of sex differences in awareness that was undetected (or not considered in the case of Matarazzo, Saslow, and Pareis), or the result of differences in motivation to respond, or due to both these factors.

In view of the fact that the HA females were the only group among the aware Ss to show evidence of a significant improvement, it would seem that their performance was largely responsible for the finding of significant sex differencesin favor of the females in the analysis of

the conditioning data.

The Sex x Noise x Anxiety Interaction

Based on the response-interference theory of anxiety two predictions had been made concerning the effect of noise-stress in the conditioning situation:

(i) In the absence of noise-stres there would be no significant difference in the performance of HA and LA Ss at either of the two levels of response class complexity.

(ii) Under noise-stres HA and LA Ss would perform differently, and the differences would be related to response class complexity. There would be a greater likelihood that the performance of HA Ss would be disrupted in the case of the more complex than the simple response class. The performance of LA Ss, however, would be facilitated with both response classes.

The first prediction was only partially upheld by the findings. In the absence of noise the performance of the HA males did not differ significantly from the LA males and females. However, contrary to expectation, the HA females were found to perform significantly better than the HA males and LA Ss.

This difference in the performance of the HA females may be attributed to the difference in their motivation to obtain the reinforcement. Although, on the basis of the response-interference theory, it would be expected that there would be no performance differences between HA and LA Ss due to anxiety, differences in performance

could result from any one of a variety of reasons other than anxiety, such as through differences in motivation. Thus, the motivation of the HA females to obtain the reinforcement would have a facilitative effect on their performance, while a comparative lack of motivation on the part of the HA males would result in their showing little improvement. A similar lack of motivation in the LA Ss would cause their performance to resemble the HA males and differ from the HA females.

The findings were consistent with the second prediction in that the introduction of noise-stress produced a significant disruption in the performance of the HA females but tended to improve that of the LA females so that they performed somewhat better than the HA females. According to the response-interference theory, the disruption in the performance of the HA was the result of the task-irrelevant tendencies evoked in them by the noise. On the other hand, the improved performance of the LA was attributable to an increase in their drive level and the predominantly task-relevant responses that they made.

Contrary to expectation, however, the noise was not found to have significantly disrupted the performance of the HA males. Furthermore, it did not facilitate the performance of the LA males. Presumably this was due to the fact that the noise evoked few task-irrelevant tendencies in the HA males and did little to raise the drive level of the LA males.

It appears, therefore, that the noise differed in its effectiveness in inducing stress in the males and females. It seems to have been effective in the case of the females, but relatively ineffective with the males. A possible explanation for this difference may be that, in general, the male culture in our society is noisier than the female culture. Thus, for example, boisterousness among males is more readily accepted than among females. If males are as a result more familiar with noise, it would be reasonable to suppose that the sounds used in the experiment would initially evoke less anxiety in them, and/or what anxiety was evoked would be reduced more quickly since they would sooner adapt to the sounds than would the females.

The findings also failed to provide any evidence for the predicted noise x anxiety x response class complexity interaction. The failure to find such an interaction, at least in the case of the female Ss in whom the noise apparently did induce stress, may be due to the fact the more complex response class was too complex to enable a sufficient differentiation in the performance between the noise-stress and no noise-stress conditions. The high level of complexity of the more complex response class is indicated by the finding that none of the Ss became fully aware that the response class consisted both of the pronouns "I" or "They" and a singular noun. By comparison, 23 of 32 or approximately 70% of the Ss were fully aware of the simple response class.

Effect of the Task-orienting Behavior

None of the effects for the task-orienting behavior variable were found to be significant in the present study. It had been expected that writing the sentences out in addition to saying them would serve to interfere with and minimize the effect of task-irrelevant tendencies evoked by the noise-stress, and thereby facilitate performance, particularly in the case of the HA Ss. Perhaps such behavior did not orient the Ss sufficiently. College students have had many years of practice in the task of writing. It may be that such a task does not require their undivided attention especially, as was frequently the case, when the sentences they gave were short.

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A P P E N D I C E S

APPENDIX A: MAS SCORES OBTAINED BY THE SUBJECTS

	High Anxious							
	Females				Males			
	Task-Oriented		Not Task-Oriented		Task-Oriented		Not Task-Oriented	
	Simple	Complex	Simple	Complex	Simple	Complex	Simple	Complex
Noise-Stress	35 34	37 34	36 33	36 35	34 30	34 29	32 30	34 29
No Noise-Stress	31 32	36 33	36 34	39 33	34 29	34 29	31 30	34 29

	Low Anxious							
	Females				Males			
	Task-Oriented		Not Task-Oriented		Task-Oriented		Not Task-Oriented	
	Simple	Complex	Simple	Complex	Simple	Complex	Simple	Complex
Noise-Stress	9 11	12 8	3 9	4 12	8 8	0 10	4 10	7 8
No Noise-Stress	8 10	3 10	7 12	8 9	4 8	7 9	7 8	7 9

APPENDIX B: PAST TENSE VERBS EMPLOYED WITH THE SIMPLE RESPONSE CLASS

realized	ordered	could	covered
missed	came	asked	touched
rested	picked	stayed	painted
found	filled	looked	appeared
kept	considered	helped	added
gave	followed	prepared	practiced
opened	hoped	thought	proved
needed	moved	changed	joined
began	allowed	agreed	wanted
stood	remembered	sat	told
went	presented	pointed	showed
offered	felt	reached	trusted
tied	got	measured	signed
heard	arrived	made	owned
planned	lighted	received	waved
accepted	talked	remained	answered
called	laughed	took	acted
said	learned	continued	became
passed	explained	left	knew
tasted	pulled	obtained	returned
brought	saved	had	planted
lived	refused	walked	sold
raised	went	did	thanked
believed	marked	dressed	covered
met	visited	played	rushed

APPENDIX B (continued): SINGULAR AND PLURAL NOUN-PAIRS EMPLOYED WITH THE MORE COMPLEX RESPONSE CLASS

length	coats	article	soldiers
mile	hours	water	circles
summer	cakes	street	doors
evening	windows	island	eggs
bed	hills	scene	cents
woman	tables	baby	lines
river	dollars	gate	notes
foot	wheels	idea	facts
child	kings	story	holes
piece	branches	body	colors
land	hands	lip	farms
man	apples	mouth	rocks
half	banks	issue	crowds
nose	reasons	country	eyes
fruit	members	tree	arms
lady	successes	glass	lakes
wife	letters	queen	chains
cup	animals	brother	directions
forest	mountains	game	fields
college	ships	ocean	stones
corner	hats	way	bones
floor	shoes	uncle	lions
sea	thoughts	prince	shots
person	towns	dinner	farmers
group	minutes	neighbor	prices
car	boys	year	homes
picture	laws	material	bags
city	offices	head	classes
ear	knees	neck	troubles
post	subjects	month	horses
meat	boards	train	seeds
dog	clouds	valley	roses
job	pairs	century	inches
club	baskets	book	voices
station	halls	storm	bridges
company	moments	week	days
roof	gifts	army	songs
fence	problems	father	nights
morning	things	son	parts
ball	movements	girl	keys
chair	daughters	market	results
hair	meetings	sister	wishes
school	walls	paper	opinions
finger	actions	kitchen	boxes
leg	boats	season	nations
church	differences	doctor	friends
bird	rooms	village	winters
yard	stars	road	efforts
garden	clocks	party	affairs

APPENDIX C: NUMBER OF 'CORRECT' RESPONSES GIVEN BY EACH SUBJECT OVER THE FIVE TRIAL BLOCKS

	High Anxious Females																			
	Task-Oriented										Not Task-Oriented									
	Simple					Complex					Simple					Complex				
Trial Blocks	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Noise-	6	8	9	10	9	5	2	3	3	3	5	5	7	11	5	2	2	2	2	4
Stress	10	12	15	15	13	3	6	6	5	8	13	12	14	10	13	6	2	3	6	2
No Noise-	6	5	7	9	8	1	6	3	13	6	6	10	14	15	13	4	6	2	4	9
Stress	8	12	16	19	18	2	6	7	9	7	5	5	11	12	14	3	2	3	6	7

APPENDIX C: (continued)

	High Anxious Males																			
	Task-Oriented										Not Task-Oriented									
	Simple					Complex					Simple					Complex				
Trial Blocks	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Noise-	11	8	7	4	7	5	4	2	4	1	9	6	10	9	4	6	4	1	5	3
Stress	8	9	8	10	12	6	4	6	7	8	4	7	8	9	8	5	4	7	1	8
No																				
Noise -	11	14	7	12	11	4	4	2	5	3	5	5	6	6	5	4	4	5	9	6
Stress	14	14	16	12	13	3	2	8	6	5	8	9	9	8	12	4	4	3	1	2

APPENDIX C: (continued)

	Low Anxious Females																			
	Task-Oriented										Not Task-Oriented									
	Simple					Complex					Simple					Complex				
Trial Blocks	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Noise-	6	5	17	20	20	1	3	2	4	3	9	10	9	10	6	4	1	2	3	2
Stress	7	8	6	6	6	4	2	5	4	5	7	4	5	12	11	4	0	1	1	5
No Noise-	10	9	8	12	6	6	1	2	4	10	5	6	8	9	12	4	3	4	4	4
Stress	7	6	3	9	5	3	1	2	6	6	8	4	7	7	7	6	6	3	4	6

APPENDIX C

	Low Anxious Males																			
	Task-Oriented										Not Task-Oriented									
	Simple					Complex					Simple					Complex				
Trial Blocks	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Noise-	12	10	5	5	7	2	1	2	4	5	9	7	3	9	5	5	3	3	7	7
Stress	8	9	8	5	10	8	1	1	5	5	10	7	8	8	10	6	4	3	7	3
No																				
Noise-	7	9	7	5	2	5	4	4	6	8	9	13	13	8	9	5	5	7	10	7
Stress	7	5	11	8	6	1	3	2	7	5	5	9	11	12	12	5	4	3	3	4

APPENDIX D: SUMMARY OF ANALYSIS OF VARIANCE WITH CONDITIONING DATA COLLAPSED OVER THE RESPONSE CLASS COMPLEXITY TREATMENT

Source of Variation	Sum of Squares	df	Mean Square	F
N (Noise)	236.39	1	236.39	
T (Task-Orientation)	8.27	1	8.27	
A (Anxiety)	47.27	1	47.27	
S (Sex)	777.02	1	777.02	8.39*
NT	62.02	1	62.02	
NA	185.64	1	185.64	
NS	13.14	1	13.14	
TA	1.89	1	1.89	
TS	123.77	1	123.77	
AS	83.27	1	83.27	
NTA	5.64	1	5.64	
NTS	37.52	1	37.52	
NAS	337.64	1	337.64	3.65**
TAS	6.89	1	6.89	
NTAS	6.89	1	6.89	
Within Cell Error	4443.25	48	92.57	
TOTAL	6376.51	63		

*$p < .01$

**$p < .10 > .05$

APPENDIX D (continued): SUMMARY OF ANALYSIS OF VARIANCE WITH CONDITIONING DATA COLLAPSED OVER THE TASK-ORIENTATION TREATMENT

Source of Variation	Sum of Squares	df	Mean Square	F
N (Noise)	236.39	1	236.39	
C (Complexity)	1.89	1	1.89	
A (Anxiety)	47.27	1	47.27	
S (Sex)	777.02	1	777.02	9.02*
NC	23.77	1	23.77	
NA	185.64	1	185.64	
NS	13.14	1	13.14	
CA	74.39	1	74.39	
CS	293.27	1	293.27	3.40**
AS	83.27	1	83.27	
NCA	34.52	1	34.52	
NCS	13.14	1	13.14	
NAS	337.64	1	337.64	3.92**
CAS	26.27	1	26.27	
NCAS	92.64	1	92.64	
Within Cell Error	4136.25	48	86.17	
TOTAL	6376.51	63		

*$p < .01$

**$p < .10 > .05$

APPENDIX D: SUMMARY OF ANALYSIS OF VARIANCE WITH CONDITIONING DATA COLLAPSED OVER THE NOISE-STRESS TREATMENT

Source of Variation	Sum of Squares	df	Mean Square	F
T (Task-Orientation)	8.27	1	8.27	
C (Complexity)	1.89	1	1.89	
A (Anxiety)	47.26	1	47.26	
S (Sex)	777.02	1	777.02	7.98*
TC	206.64	1	206.64	
TA	1.89	1	1.89	
TS	123.77	1	123.77	
CA	74.39	1	74.39	
CS	293.27	1	293.27	3.01**
AS	83.27	1	83.27	
TCA	23.77	1	23.77	
TCS	23.77	1	23.77	
TAS	6.89	1	6.89	
CAS	26.27	1	26.27	
TCAS	1.89	1	1.89	
Within Cell Error	4676.25	48	97.42	
TOTAL	6376.51	63		

*$p < .01$

**$p < .10 > .05$

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